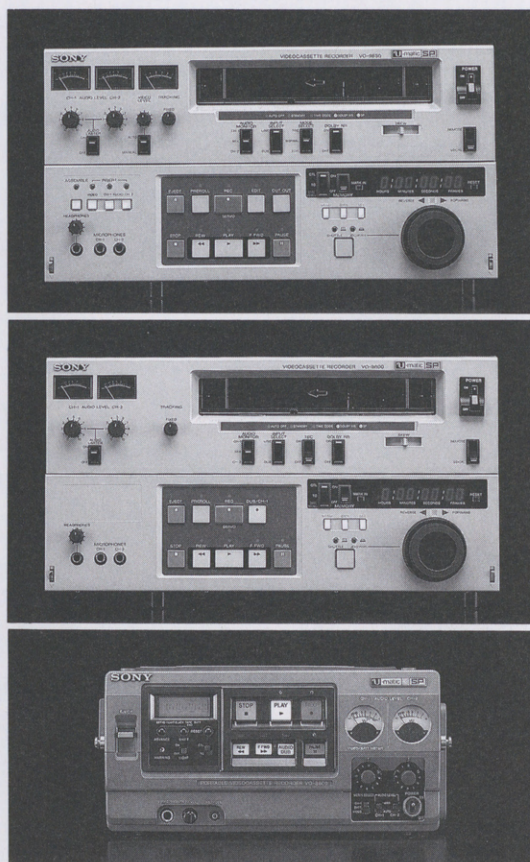


VO-9850/9800/8800 PRODUCT INFORMATION MANUAL (NTSC/PAL)



SONY®

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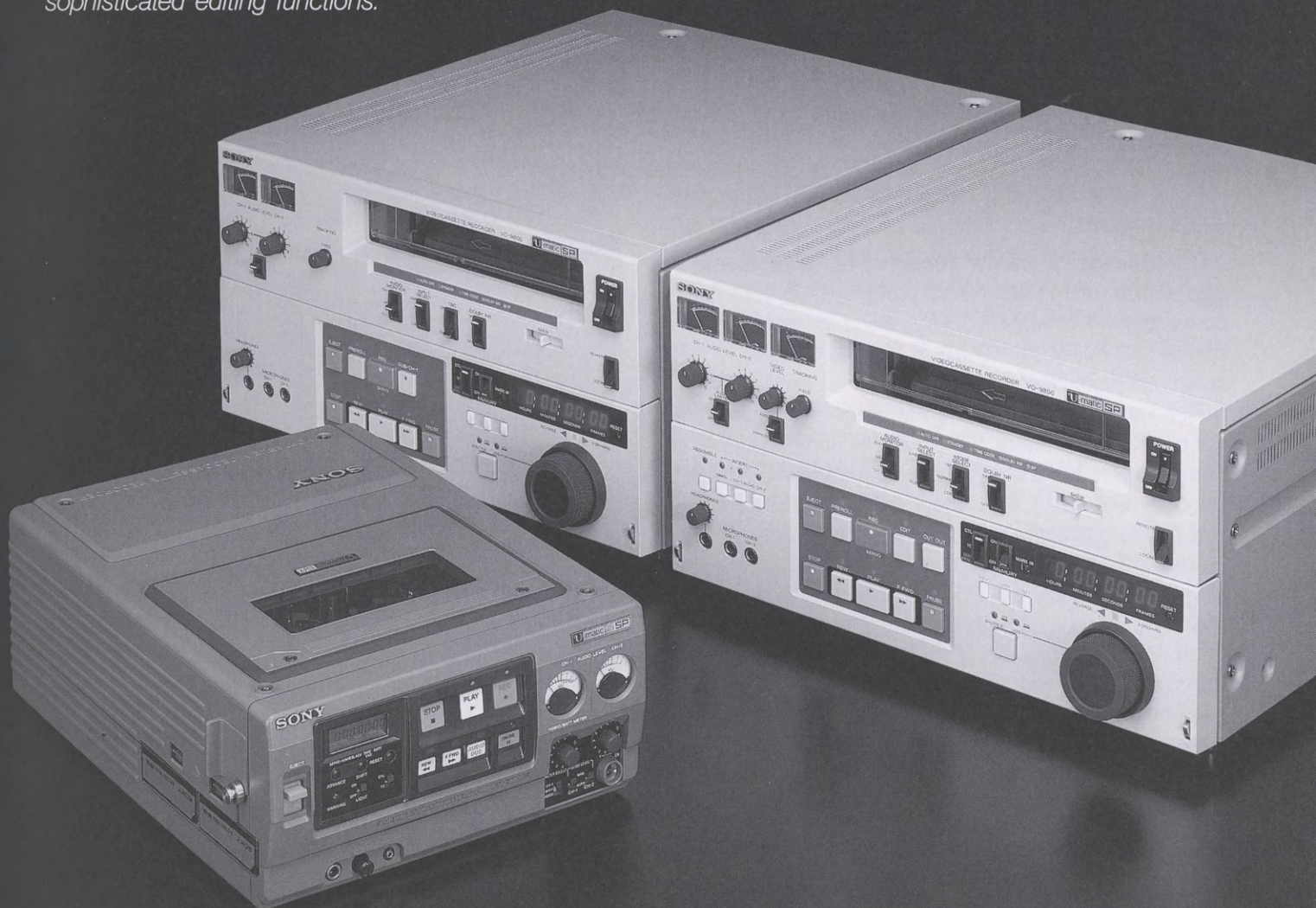
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I. INTRODUCTION

Sony's U-matic, a worldwide standard format in the professional video field, has made another big step forward, with the addition of economical SP U-matics, which offer the best in U-matic technology: the VO-9850 Editing SP U-matic VTR, the VO-9800 SP U-matic VTR (feeder), and the VO-8800 portable SP U-matic VTR.

The new SP U-matic VTRs are provided to answer requirements in program origination applications for multi-generation recording capability with high quality video and audio. These new units can be added to current Sony systems with no modification because of Sony's product development policy of maintaining format compatibility and system consistency. The BKU-704 Time Code Reader (for the VO-9800/9850) and BKU-705 Time Code Generator/Reader (for the VO-9850) offer precise time code editing with the RM-450 Editing Control Unit through a 9-pin REMOTE connector (RS-422 serial interface), and the BKU-706 Time Code Generator adds the time code recording function to the VO-8800. The BKU-704, BKU-705, and BKU-706 can be installed into the VTRs.

Furthermore, the VO-9850 and VO-9800 are provided with a JOG/SHUTTLE dial, the Dial Menu Operation function, and a character display. The VO-8800 also provides new features, such as a separate Y/C input through a 14-pin camera connector. These new SP U-matic VTRs can satisfy the needs of professional users in the production of video programs with their superior multi-generation recording capability and sophisticated editing functions.



II. TECHNICAL ADVANTAGES OF THE VO-9850/9800/8800

A multi-generation dubbing capability and a time code editing capability have always been required in program origination applications since the beginning of video production. The new U-matics provide SP technology (SP format, innovative video circuits, sendust audio head, and type-C Dolby NR), which offers superior video/audio quality and multi-generation dubbing capability, and a time code editing capability to answer these requirements.

1. Superior Video

Program information for distribution or transmission is created in a process which includes shooting, editing, and distribution. Even with minimal editing, the process requires three or four generations. Therefore, an editing VTR is required to have multi-generation recording capabilities to maintain a high quality picture throughout the program origination process. Picture quality of the SP U-matic offers improvement over conventional U-matic not only because of the improvement in the recording format, but also due to the improvement of the video circuits for playback and editing. All of this was done while maintaining compatibility with the conventional U-matic (NTSC)/High Band U-matic (PAL).

SP Format

The luminance FM carrier frequency of the SP format was shifted up 1.2MHz (NTSC)/0.8MHz (PAL) from the conventional format (NTSC)/High Band format (PAL) to realize 330 TV lines (NTSC)/300 TV lines (PAL) of horizontal resolution. The downconverted subcarrier frequency and the luminance FM carrier deviation were not changed. Therefore, SP U-matic is completely compatible with the conventional U-matic (NTSC)/High Band U-matic (PAL). SP U-matic videocassettes are required to guarantee high frequency bandwidth on SP recordings. The detection holes on the SP U-matic videocassette allow the VTR to change to the SP recording mode automatically.

In the PAL system, three U-matic formats, SP, High Band, and Low Band, are offered to meet different user demands. Since SP and High Band formats were developed to improve total picture quality to meet ENG applications for TV stations, the compatibility between SP/High Band and Low Band U-matics can not be obtained. The newly released economical SP U-matics, the VO-9800P and VO-9850P, which can playback in the SP, High Band, and Low Band formats, and record in the

SP or High Band format, can offer superior picture performance and, therefore, are convenient for Low Band U-matic users.

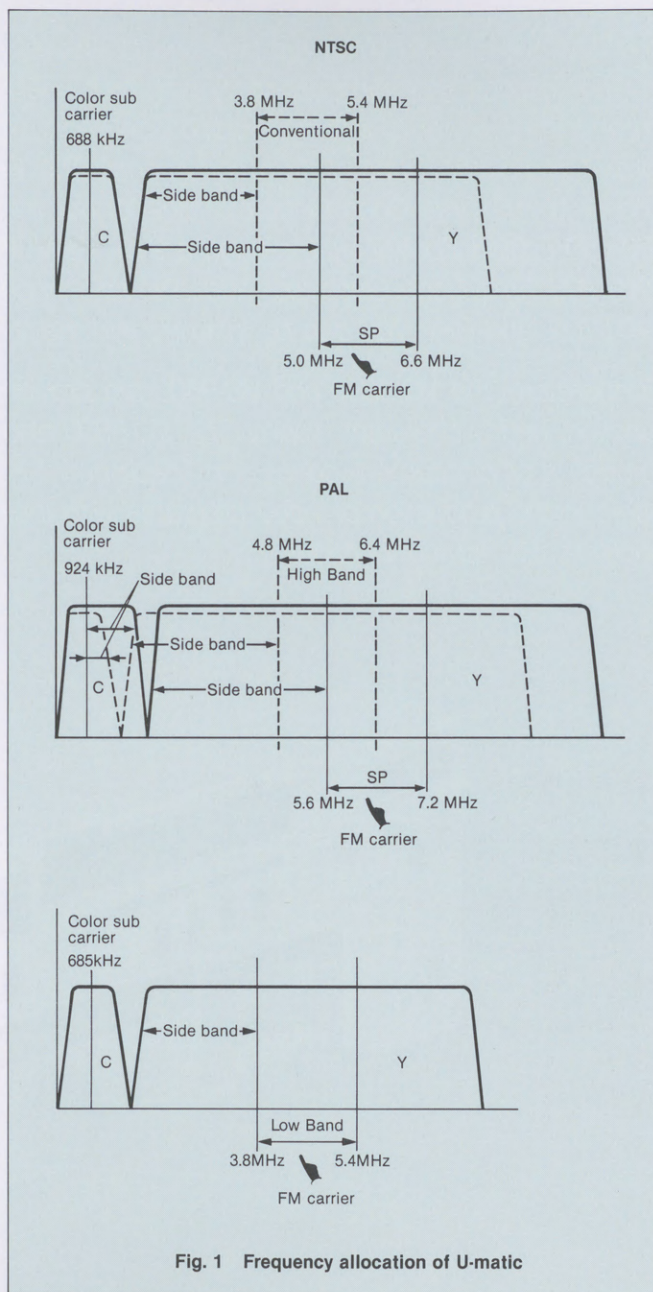
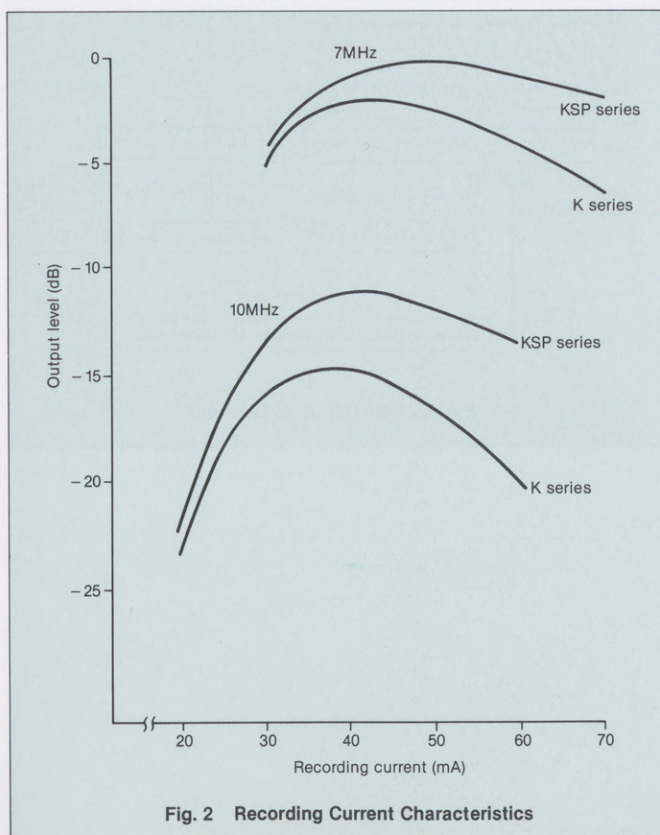
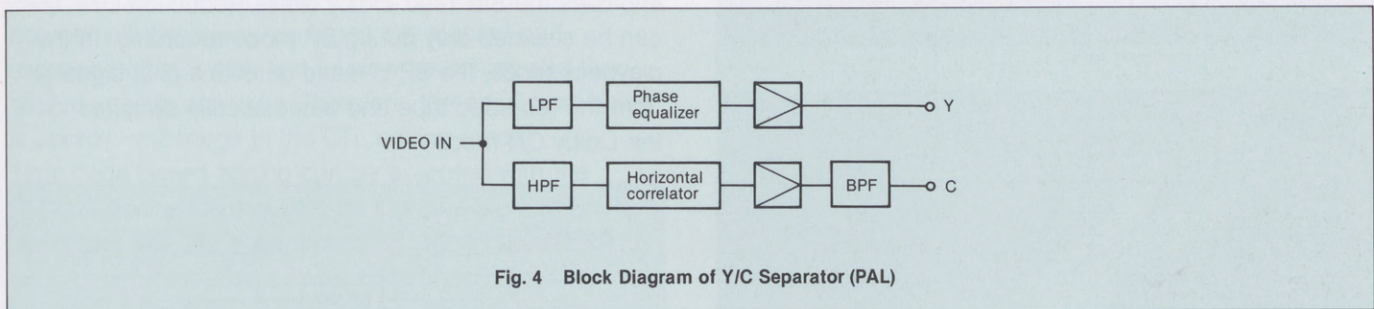
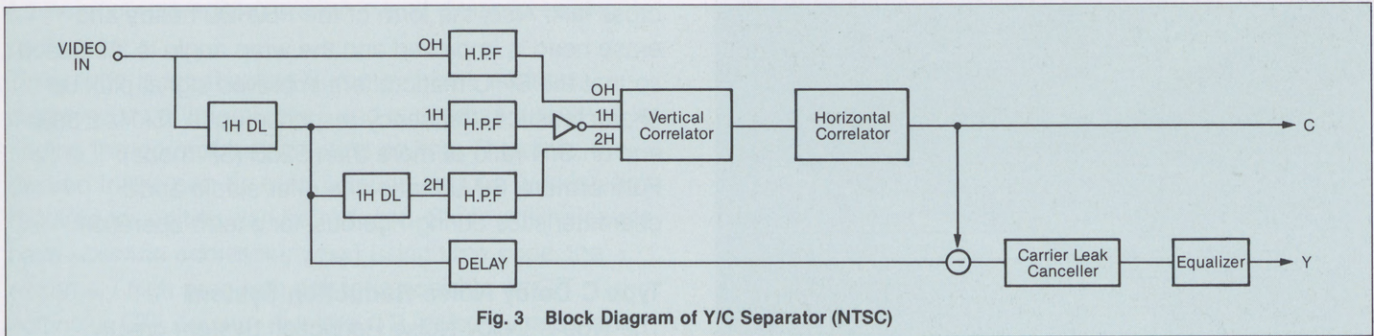


Fig. 1 Frequency allocation of U-matic

New Y/C Separator

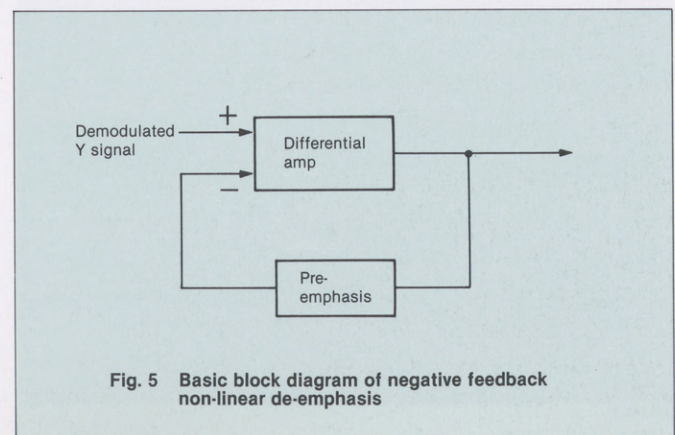
The new Y/C separator of the SP U-matic reduces the cross color leakage of luminance signals into chrominance signals and vice-versa via the 3-line comb filter (NTSC) and the horizontal correlator (NTSC/PAL).

Therefore, chrominance ringing due to cross color can be greatly reduced. Furthermore, the luminance signals are sent through a phase equalizer, which reduces signal degradation and luminance ringing caused by dubbing.



New Noise Canceller System (VO-9850/9800)

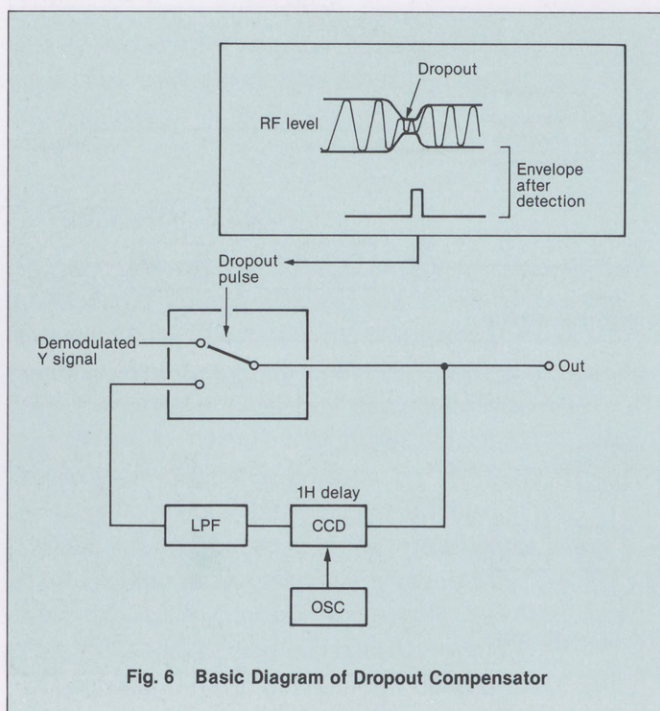
The SP U-matic uses a non-linear pre-emphasis circuit and a non-linear de-emphasis circuit. The de-emphasis circuit uses a negative feedback loop using the same pre-emphasis circuit that is employed in the record mode. The de-emphasis circuit can therefore completely reverse the characteristics of pre-emphasis. The reproduction characteristics of the demodulated wave form are greatly improved. Therefore, the SP U-matic can reduce correlated noise components which appear in recording and improve the S/N ratio.



II. TECHNICAL ADVANTAGES OF THE VO-9850/9800/8800

CCD Based Dropout Compensator

Dropout of video signals is compensated for by a CCD based 1H delay line circuit to improve picture quality. The result is a greatly simplified circuit with high reliability.



The improvements of the SP U-matic are not only found in the increase of the horizontal resolution, which has also been done for home use VTRs, but also in the improvement of the demodulation registration characteristics and the reduced cross color, luminance and chrominance ringing, and signal degradation. Therefore, the SP U-matic improves dubbing quality to offer high quality pictures for program origination and production.

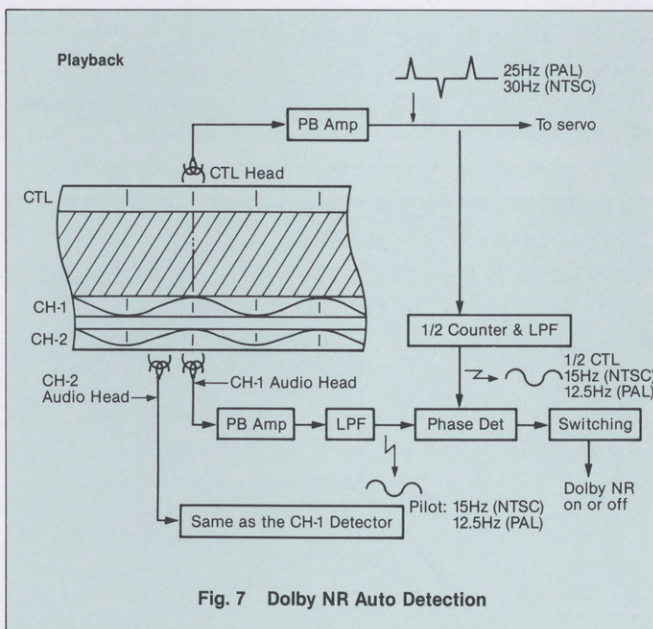
2. Superior Audio

New Sendust Audio Head

The new sendust audio head is compact and improved to reduce the contour effect and channel to channel cross talk. Also, the form of the PB/REC heads and erase head is improved and the wrap angle is increased so that the SP U-matic offers improved signal pick up characteristics, frequency response up to $15\text{kHz} \pm 3\text{dB}$, and an S/N ratio of more than 52dB (SP mode). Furthermore, SP U-matic can offer stable audio characteristics during rigorous, long-term operation.

Type-C Dolby Noise Reduction System

The type-C Dolby Noise Reduction System greatly improves the S/N ratio. Dolby Noise Reduction ON/OFF can be selected only during SP mode recording. In the playback mode, the SP U-matic detects a pilot signal from the recorded tape and automatically switches to the Dolby ON mode.

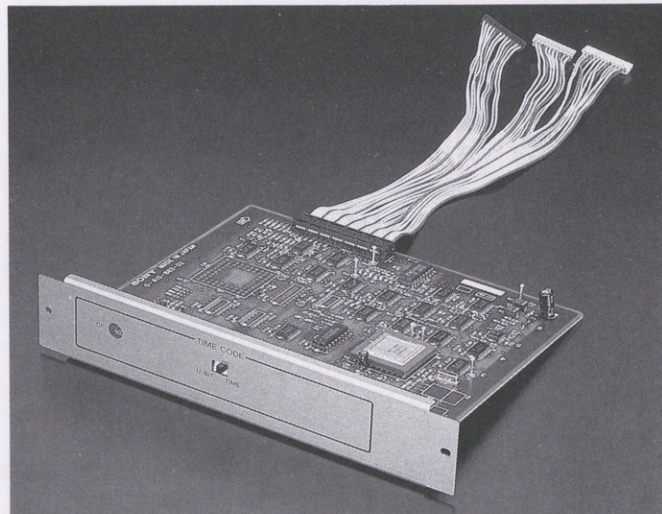


3. Time Code Editing Capability

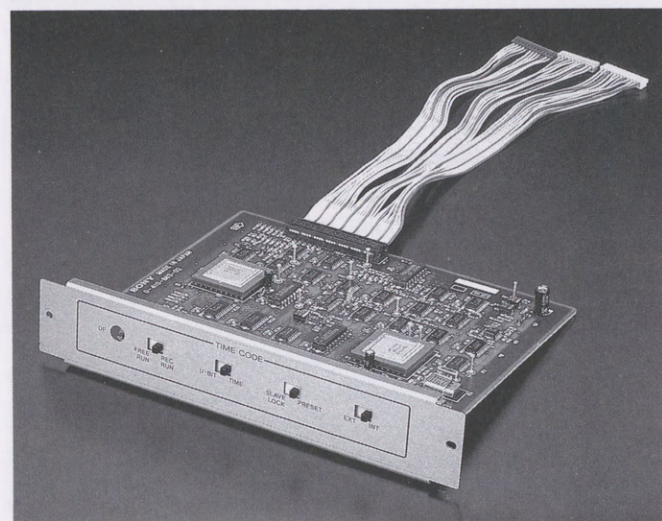
The new SP U-matics are provided with a 9-pin REMOTE connector (RS-422 serial interface) and an optional time code operation capability. These new features offer frame accurate editing precision and dynamic editing performance.

Time code is an absolute frame by frame address, displayed as a time number, and is used as a method for finding the correct frame during editing. Therefore, the desired frame can be quickly found and the working time required for editing can be reduced. Since editing points have absolute addresses when using time code, the extremely high precision editing is possible. In CTL editing, a CTL counter displays CTL pulse counts via a time number. The accuracy of the number on the CTL counter will change when tapes are ejected or if slippage occurs when fast or slow searching and tape shuttle speeds are used. Therefore, the editing precision is approx. ± 2 frame in the CTL editing mode.

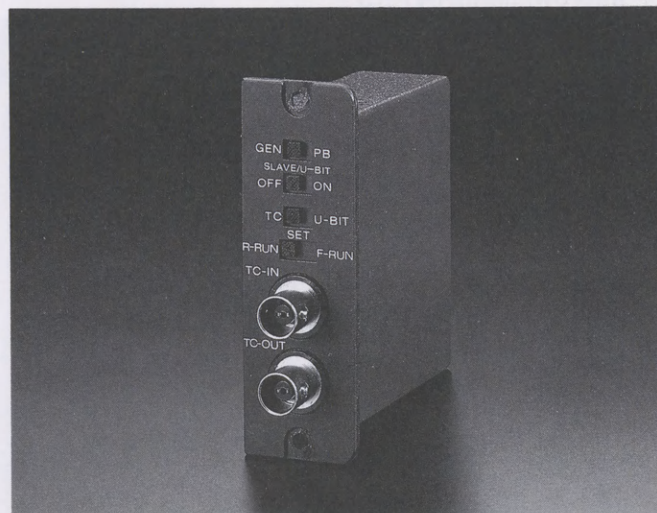
Time code based editing can be executed with the RM-450 Editing Control Unit through the 9-pin REMOTE connector (RS-422 serial interface). Two optional time code generator/readers and a time code reader are available—the BKU-704 Time Code Reader for the VO-9850 and VO-9800, the BKU-705 Time Code Generator/Reader for the VO-9850, and the BKU-706 Plug-in Time Code Generator for the VO-8800. As the BKU-704, BKU-705 and BKU-706 can be installed into each VTR, the VTRs remain compact.



BKU-704



BKU-705



BKU-706

III. VO-9850/9800 OUTSTANDING FEATURES

1. Video System

Superior Picture Quality (NTSC/PAL)

The VO-9850 and VO-9800 are the new generation of editing U-matic from Sony. The SP U-matic technology incorporated in these units was developed to achieve an overall quality improvement of the U-matic format. The VO-9850 and VO-9800 offer not only 330 TV lines (NTSC)/300 TV lines (PAL) of horizontal resolution, but also greatly reduced luminance and chrominance ringing while maintaining a high signal-to-noise ratio. Therefore, the VO-9850/9800 provides a multi-generation dubbing

capability in which the third generation picture quality in SP recording equals to the first generation picture quality in conventional (NTSC)/High Band (PAL) recording. The VO-9850/9800 can transmit luminance and chrominance signals separately through DUB connectors for minimum picture degradation caused by dubbing. Since the luminance and chrominance signals do not go through a Y/C separator in the recorder and the chrominance signal is also transmitted as a downconverted signal, DUB connector dubbing keeps the picture quality high.

Complete Interchangeability between SP and Conventional U-matic (NTSC)

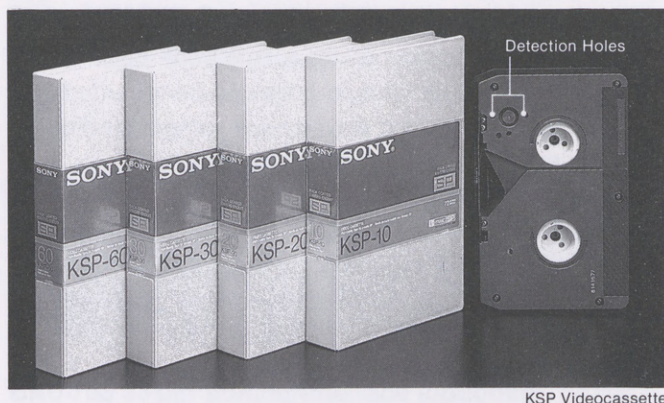
The SP U-matic format is interchangeable with the conventional U-matic format. Conventional U-matics can playback SP U-matic recorded videocassette, and SP U-matics can playback conventional U-matic recorded videocassette. The chart below shows the various combinations of SP and conventional hardware and videocassettes and which combinations offer improved resolution, luminance ringing and chrominance ringing.

Recording and Playback Modes (NTSC)

	REC	PB
SP	YES	YES
CONV.	YES	YES

SP Improvements (NTSC)

Tape	Recording machine	Playback machine	Luminance frequency response (resolution)	Luminance ringing	Chrominance ringing
KSP tape	SP	SP	Very much improved	Very much improved	Very much improved
KSP tape	SP	Conventional	Much improved	Much improved	Improved
KSP tape	Conventional	SP	—	—	Improved
KSP tape	Conventional	Conventional	—	—	—
KCA/KCS tape	SP	SP	—	Much improved	Much improved
KCA/KCS tape	SP	Conventional	—	Improved	Improved
KCA/KCS tape	Conventional	SP	—	—	Improved
KCA/KCS tape	Conventional	Conventional	—	—	—



KSP Videocassette

SP/High Band Recording and SP/High Band/Low Band Playback (PAL)

Thanks to the SP/High Band recording, the VO-9850P/9800P can offer advanced high quality pictures over the other color under VTRs. In the playback mode, the VO-9850P/9800P provides SP/High Band/Low Band playback capability and can playback many Low Band U-matic cassettes still in video libraries. The chart below shows the various combinations of SP and High Band hardware and videocassettes and which combinations offer improved resolution, luminance ringing and chrominance ringing.

Note: DUB connectors can not be used for editing/dubbing of Low Band recorded signals since the VO-9850P/9800P does not provide Low Band recording mode. If a Low Band recorded tape is installed into the VO-9850P as a recorder in the editing mode, since the VO-9850P does not provide Low Band recording mode, the VO-9850P records in High Band or SP mode on the Low Band recorded tape. Therefore, in the editing mode, the VO-9850P does not playback in Low Band mode to prevent such problems in the recording format.

Recording and Playback Modes (PAL)

	REC	PB
SP	YES	YES
High Band	YES	YES
Low Band	NO	YES

SP Improvements (PAL)

Videocassette	Recording U-matic	Playback U-matic	Luminance frequency response (resolution)	Luminance ringing	Chrominance ringing
KSP tape	SP	SP	Very much improved	Very much improved	Very much improved
KSP tape	SP	High Band	Much improved	Much improved	Improved
KSP tape	High Band	SP	—	—	Improved
KSP tape	High Band	High Band	—	—	—
KCA/KCS tape	SP	SP	—	Much improved	Much improved
KCA/KCS tape	SP	High Band	—	Improved	Improved
KCA/KCS tape	High Band	SP	—	—	—
KCA/KCS tape	High Band	High Band	—	—	—

III. VO-9850/9800 OUTSTANDING FEATURES

2. Audio System

Superior Quality Audio

The VO-9850/9800 adopts a new sendust head and a new audio circuit for superior audio quality. The frequency response is improved to 50Hz - 15kHz \pm 3dB, and the S/N ratio is improved to 52dB.

Type-C Dolby Noise Reduction System

The type-C Dolby Noise Reduction System improves the S/N ratio to 72dB with Dolby ON (measured by the CCIR/ARM filter) and works only in SP recording/playback modes. The Dolby NR mode can be selected with the Dolby ON/OFF switch in the record mode and is automatically activated when the Dolby NR pilot signal is detected during playback.

XLR connectors

The VO-9850/9800 provides audio XLR connectors for connection with professional audio equipment and for stable transmission of audio signals.

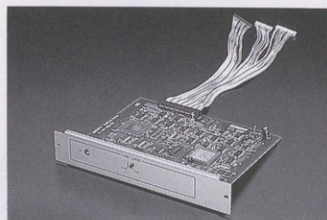
3. Time Code Capability

Time Code Recording/Playback

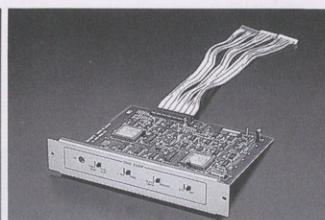
The VO-9850/9800 incorporates a time code REC/PB head. Therefore, external time code can be recorded on the appropriate track and played back without a time code generator/reader. An optional Time Code Generator/Reader, the BKU-705, can be installed into the VO-9850. This allows the VO-9850 to read and generate in addition to record and playback time codes without an external time code generator/reader. An optional Time Code Reader, the BKU-704, can be installed into the VO-9850/9800 to allow time codes to read.

Main Features of the BKU-704 and BKU-705

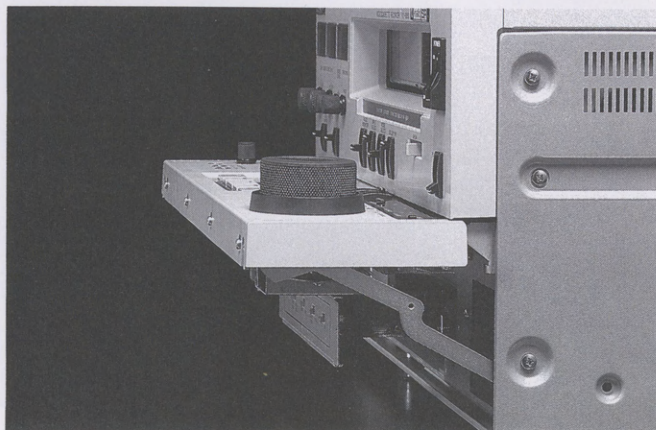
- Can read SMPTE/EBU time code. (BKU-704/BKU-705)
- Can generate and set SMPTE/EBU time code. (BKU-705)
- User bits, drop/non-drop frame code (NTSC only), phase correction bit, and binary group flag bit can be set via the Dial Menu Operation. (BKU-705)
- Free-run/rec-run mode can be selected via a free-run/rec-run switch on the BKU-705. (BKU-705)
- Time code or user bits can be superimposed for viewing on the video signal via the Dial Menu Operation. (BKU-704/705)
- The BKU-705 has regeneration capability to an external time code or the time code previously recorded on the tape during assemble editing. (BKU-705)
- Easy installation. (BKU-704/705)



BKU-704



BKU-705



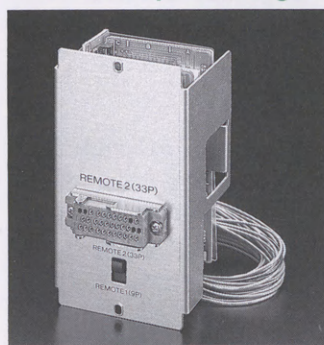
4. Interface

9-pin REMOTE Connector (RS-422 serial interface)

The VO-9850/9800 provides 9-pin REMOTE connector (RS-422 serial interface) for connection and editing with the RM-450 Editing Control Unit.



BKU-703 33-pin Editing Interface (optional)

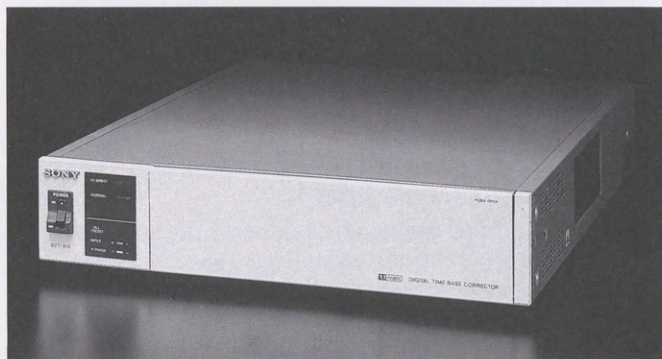


BKU-703

The BKU-703 33-pin Editing Interface board can be installed into the VO-9850/9800 for connection with the RM-440 Editing Control Unit or other 33-pin remote control units, such as the RM-500, RM-580, and RM-555.

TBC Connection

The VO-9850/9800 provides EXT SYNC IN, SC IN (NTSC only), and RF OUT (OFF TAPE) for connection with an external time base corrector such as the BVT-810. When a TBC is used, the TBC ON/OFF switch on the VO-9800 or the TBC/NORMAL/EDIT switch on the VO-9850 must be set to TBC ON mode or TBC mode. The TBC can then only be used for playback.



BVT-810

5. Editing Facility

VO-9850 for Full Editing

● Assemble and Insert (V/A1/A2) Editing Modes

Independent editing of video, channel-1 audio or channel-2 audio is possible in the insert edit mode. The VO-9850 ensured a clean edit at each edit in and out point.

Note: When an SP recorded videocassette is loaded in the VO-9850, the editing will be performed in the SP recording mode. If the loaded videocassette is non-SP recording, and even when the videocassette is an SP videocassette, the VO-9850 will perform the edit in conventional (NTSC)/High Band (PAL) recording mode.

● Time Code Based Editing

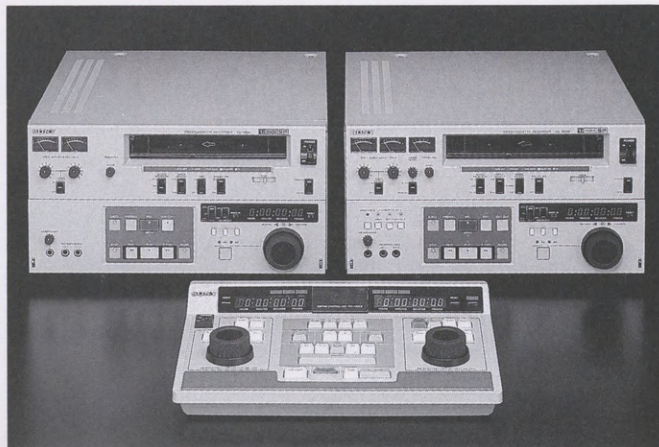
When the BKU-705 Time Code Generator/Reader is installed into the VO-9850, time code based editing can be executed. When the tape, which was previously recorded time codes, is used in the insert editing mode, the BKU-704 Time Code Reader is installed into the VO-9850 and time code based editing can be also executed.

● Controlled Via the RM-450

The RM-450 can effectively handle editing functions of the VO-9850, such as IN-POINT/OUT-POINT ENTRY, PREVIEW, TRIM, AUTO EDIT/END, REVIEW/JUMP, GO TO, AUDIO SPLIT, and LAST EDIT. When the BKU-705 is installed into the VO-9850, time code information is available through the 9-pin REMOTE connector. The combination of the VO-9850/9800 and RM-450 creates an ideal time code editing system.

● Controlled Via the RM-440

When the optional BKU-703 Editing Interface Board is installed into the VO-9850, the VO-9850 can be connected to the RM-440 for editing with the current VO-5850/5800 U-matic VTR.



III. VO-9850/9800 OUTSTANDING FEATURES

VO-9800 as Player for Editing

● Player for Editing

The VO-9800 can be used as the player in an editing system that include the VO-9850 and RM-450. When the BKU-704 Time Code Reader is installed into the VO-9800, the VO-9800 can be also used for time code editing. When the optional BKU-703 33-pin Editing Interface Board is installed into the VO-9800, the VO-9800 can be used with the RM-440 Editing Control Unit for editing as a player.

● Back-space Editing Capability

The VO-9800 provides a back-space editing capability for smooth transitions between scenes.

● Audio Dubbing on CH-1

Additional audio for narration and background music is easy to record via the audio dubbing function. Additional audio is recorded on audio channel 1 on the already recorded tape.

Picture Search

SHUTTLE MODE

The SEARCH DIAL on the VO-9850/9800 can offer various speeds, STILL, 1/30, 1/10, 1/5, 1/2, 1, 2, 5 or 8 times normal speed in both the forward and reverse directions. In the STILL mode, a noiseless still picture, in which the guard band noise is located on the upper or bottom part of the monitor screen, is available. (On/Off selectable via Dial Menu Operation: ITEM 225)

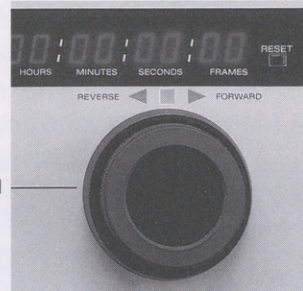
JOG MODE

In the JOG mode, accurate frame by frame search in both directions, as directed by the rotation of the SEARCH DIAL, is possible.

6. Dial Menu Operation

Setting the various modes, such as time code, user bits and time code/user bits superimpose, on the VO-9850/9800 is easy and convenient via the Dial Menu Operation. When the Dial Menu Operation is used to change a setting from the

"machine default" the asterisk which appears in the superimposed video from the monitor output connector will not be displayed. Also, self-diagnostic and hour meter data can be displayed on the LED counter or monitor via Dial Menu Operations.



BASIC FUNCTIONS

- 101 TIME CODE PRESET (When the BKU-705 is installed)
- 102 U-BIT PRESET (When the BKU-705 is installed)
- 105 CHARACTER POSITION
- 106 CHARACTER SIZE: SMALL/LARGE
- 200 SET UP GRADE: BASIC/ENHANCED

ENHANCED FUNCTIONS

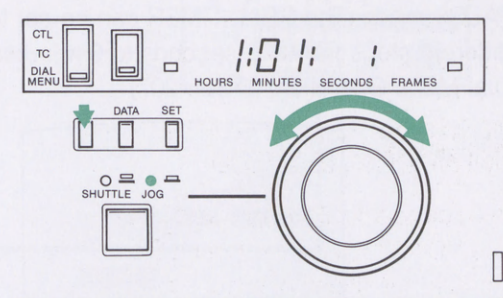
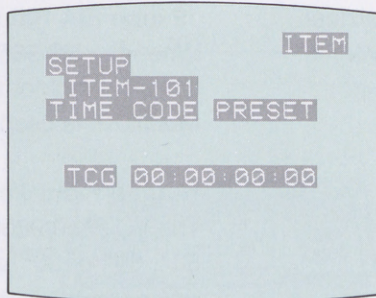
- 201 ERROR STATUS (Self-diagnostics)
- 202 DF/NDF SELECT (drop/non-drop frame) for NTSC only (When the BKU-705 is installed)
- 203 PHASE CORRECTION setting (When the BKU-705 is installed)
- 204 U-BIT BINARY GROUP FLAG bit setting (When the BKU-705 is installed)
- 205 HOUR METER (DRUM): 0 - 15,000H
- 206 HOUR METER: 0 ~ 15.000H
- 207 STILL TIMER setting: 0.5/1/5/10/20/30/40/50 sec./1/2/3/4/5/6/7/8 min.
- 209 SELECTION FOR SEARCH DIAL mode setting: DIAL DIRECT/VIA SEARCH BUTTON
- 214 PREROLL TIME setting: 0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15 sec.
- 217 EDIT DELAY SETTING: 2 FRAMES/6 FRAMES
- 218 PINCH ON DELAY setting: 0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15
- 224 TAPE PROTECTION mode setting: STEP FWD/STANDBY OFF
- 225 NOISELESS STILL mode setting: ON/OFF

Dial Menu Operation Procedure

Dial Menu Operation can be activated in the JOG MODE and when the "DIAL MENU" mode is selected. The videocassette must be in the STOP mode. The time code preset procedure* is described in the following illustration.

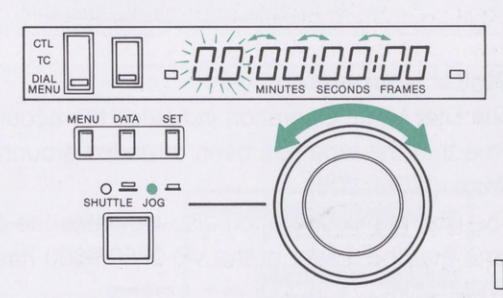
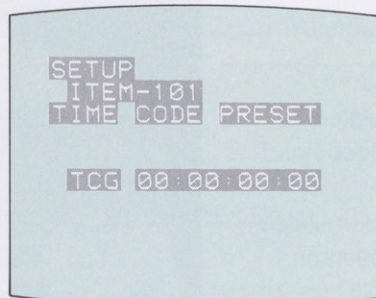
I. Select the ITEM number

While pressing the MENU button, turn the SEARCH DIAL and select the desired ITEM number.



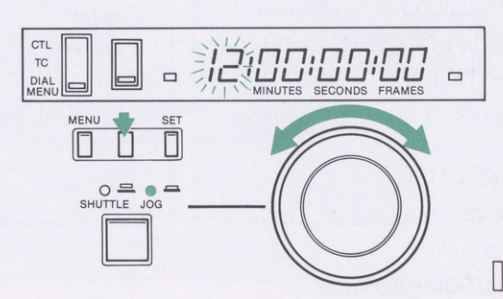
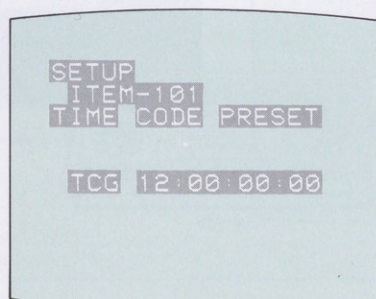
II. Select DATA position

The setting which can be set or reset will blink. To move the blinking position from digit to digit, turn the SEARCH DIAL (hours, minutes, seconds, or frames).



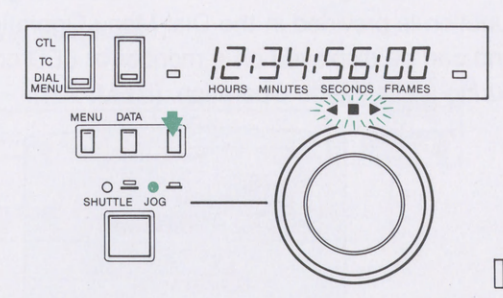
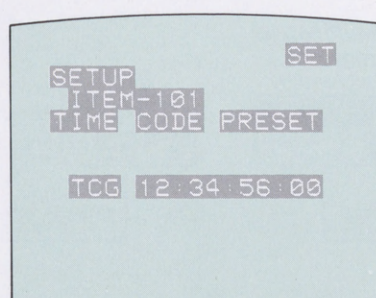
III. Select DATA

While pressing the DATA button, turn the SEARCH DIAL to select the desired numerals.



IV. Setting

Press the SET button to finish the setting.



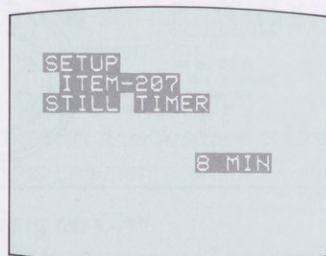
* Time code can be set only when the switches on the panel of the BKU-705 are set to PRESET and INT (internal).

III. VO-9850/9800 OUTSTANDING FEATURES

7. Reliability

STILL TIMER (Anti-clog Facility)

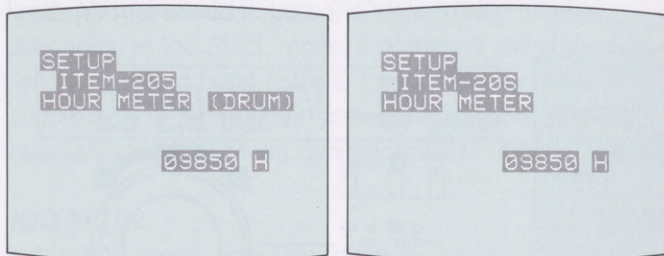
The STILL TIMER is provided to prevent tape and head damage from occurring during long term STILL. When the STILL mode has been on for more than 8 min., the VO-9850/9800 automatically moves into the LONG PAUSE mode. The STILL TIMER can be set to sixteen different steps from 0.5 seconds to 8 minutes via the Dial Menu Operation. (ITEM: 207)



Digital Hour Meters

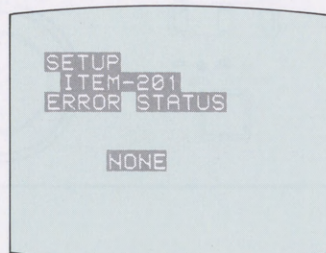
The Dial Menu Operation indicates the accumulated time that the tape has been threaded around video head drum. (ITEM: 205)

The Dial Menu Operation also indicates the accumulated time that the power of the VO-9850/9800 has been on. (ITEM: 206)



Self-diagnostics

Service time for the VO-9850/9800 is kept to a minimum via the self-diagnostic function. The self-diagnostic function is provided in the Dial Menu Operation menu and can be displayed on a monitor or LED counter during a Dial Menu Operation. (ITEM: 201)



8. Installation

5 Units High

The VO-9850/9800 is 5 units high and maintains this compactness even when the time code board is installed.

19 inch EIA Rack Mountable

When the VO-9850/9800 is installed into a 19 inch EIA standard rack or the SONY SU rack, the RMM-501 Rack Mount Kit is used.

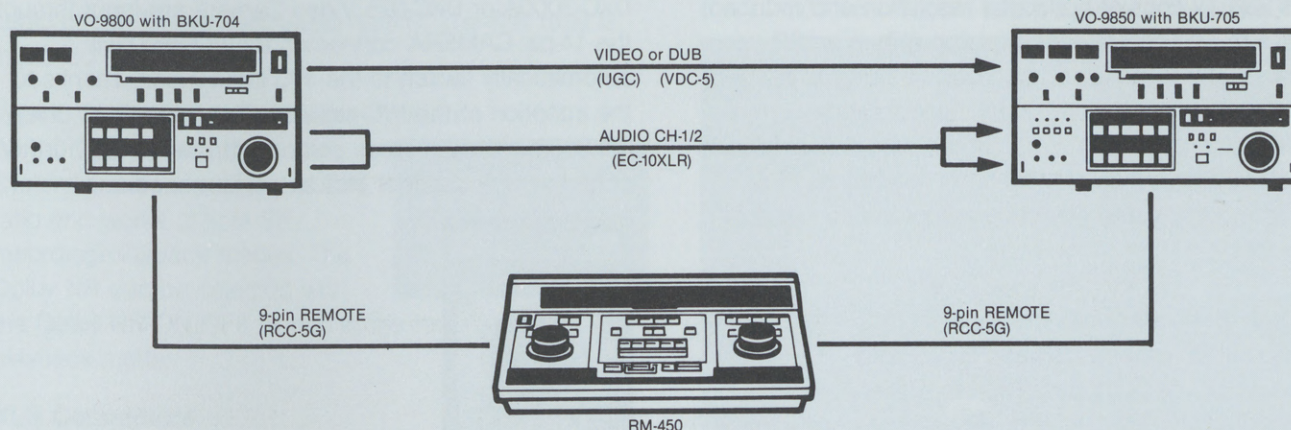
Hinged Front Panel

The VO-9850/9800's front panel can be slanted at a 0°, 30°, 60° or 90° angle.

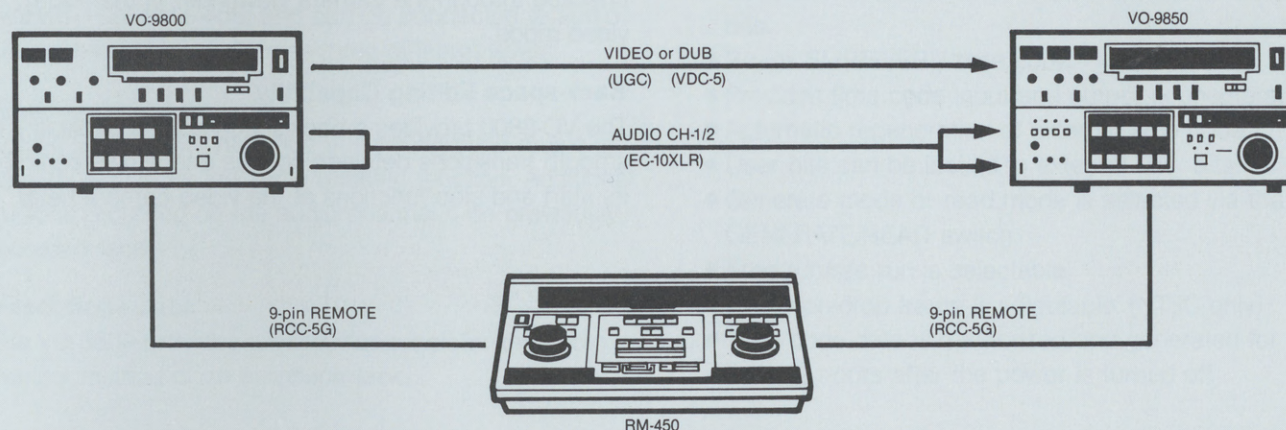


9. VO-9850/9800 System Applications

Example 1. Time code based editing system

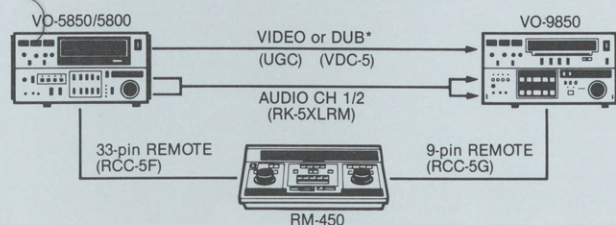


Example 2. CTL based editing system

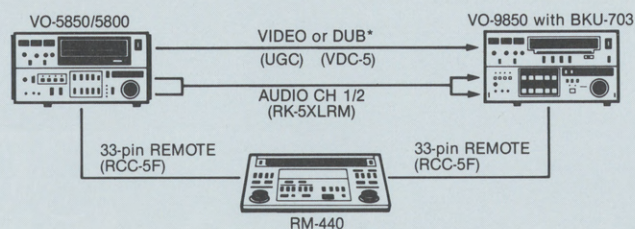


Example 3. Editing system with the VO-5800/5850

(a) Controlled via the RM-450



(b) Controlled via the RM-440



*Note: When the VO-5850P/5800PS and VO-9850P are used, the DUB IN and DUB OUT connection cannot be used because the VO-9850P does not provide Low Band recording capability. Therefore, the VIDEO IN and OUT must be used.

IV. VO-8800 OUTSTANDING FEATURES

1. Video System

SP/Conventional Mode Recording/Playback for NTSC

By incorporating SP U-matic technology, the VO-8800 offers 330 TV lines of horizontal resolution and reduced luminance and chrominance ringing. When an SP videocassette is installed, the VO-8800 records in the SP mode, and when a conventional videocassette is installed, the VO-8800 records in the conventional mode. In the playback mode, the VO-8800 detects the FM carrier frequency and selects the appropriate mode of operation.

SP/High Band Recording/Playback Mode for PAL

The VO-8800P provides SP and High Band recording/playback modes. Therefore, the VO-8800P offers broadcast level, high quality pictures providing 300 TV lines of horizontal resolution and reduced luminance and chrominance ringing in SP recording to satisfy field production users. When a Y/C separate signal is input and recorded, the VO-8800P can offer 330 TV lines of horizontal resolution.

Y/C Separate Input (14-pin CAMERA input)

When Y/C separate video signals from the DXC-M7, DXC-3000A or DXC-325 Video Camera are input through the 14-pin CAMERA connector, the VO-8800 will automatically switch to the Y/C input mode. Thanks to the adoption of the Y/C separate input capability, the VO-8800 improves cross color performance and further enhances the superior picture performance.

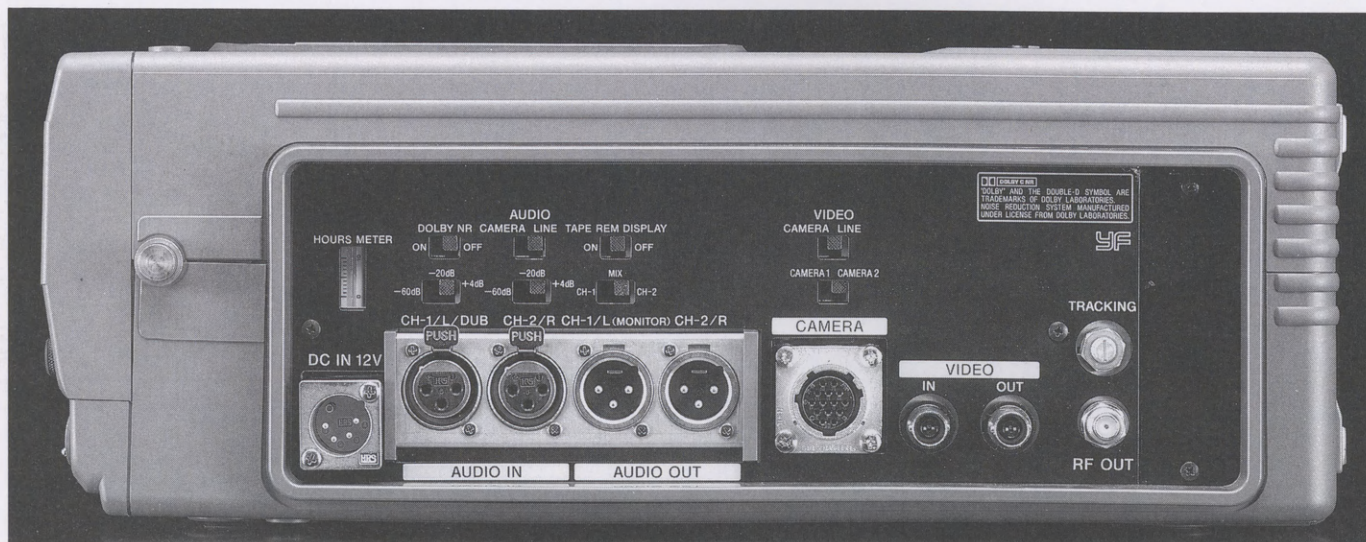


Video Confidence Heads

Since the VO-8800 provides video confidence heads, a real time recording picture can be monitored and checked through the camera viewfinder in the return video mode.

Back-space Editing Capability

The VO-8800 provides a back-space editing capability for smooth transitions between scenes and allows control of its start and stop functions at the video camera head.



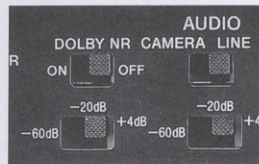
2. Audio System

Superior Quality Audio

The VO-8800 adopts a new sendust head and a new audio circuit for superior audio quality. The S/N ratio is improved to 52dB.

Type-C Dolby Noise Reduction System

Type-C Dolby Noise Reduction System greatly improves the S/N ratio and works only in SP recording/playback modes. The Dolby NR can be selected with the Dolby NR ON/OFF switch in the recording and playback mode.



XLR Connectors

The VO-8800 provides audio XLR connectors for connection with professional audio equipment or microphones. XLR connectors are rugged and provide stable transmission of audio signals. The audio input connectors are selectable for three modes, -60dB/-20dB/+4dB, and can be connected to audio equipment with any of these three different levels.

Audio Dubbing on CH-1

Additional audio for narration and background music is easy to record via the audio dubbing function. Additional audio is recorded on the audio channel 1 on previously recorded tape.

Headphone Jack

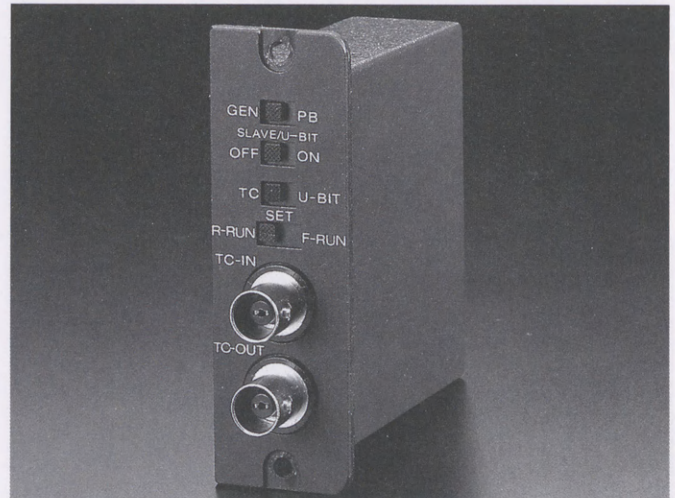
The VO-8800 provides a headphone jack for the audio monitor instead of an earphone jack.



3. Time Code Capability

BKU-706 Time Code Generator (optional)

When the BKU-706 Time Code Generator is installed, the VO-8800 can record and playback time codes.



BKU-706

Main Features of the BKU-706

- Generates and sets SMPTE/EBU time code and user bits.
- Reads SMPTE/EBU time code.
- Provides time code input and output connectors.
- Automatic regeneration of external time code.
- User bits can be locked to external user bits.
- Generate mode or read mode is selected via the GENERATE/READ switch.
- Free run/rec run is selectable.
- Drop/non-drop frame is selectable. (NTSC only)
- Time code data is memorized and generated for more than 12 hours after the power is turned off.



IV. VO-8800 OUTSTANDING FEATURES

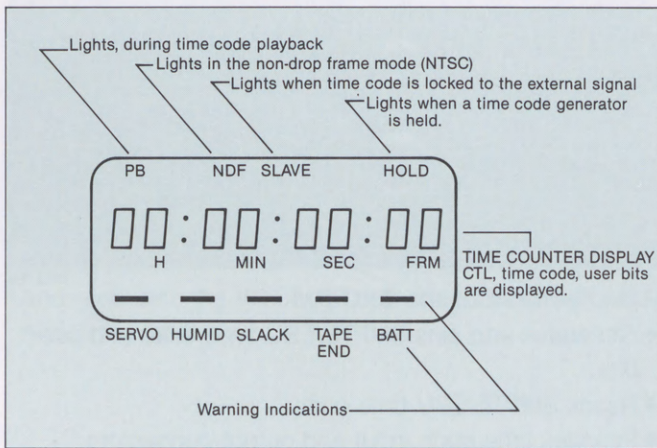
4. Easy Operation

New Front Panel Design

The front panel is newly designed to meet user demands. The function buttons are slightly slanted to allow comfortable operation. A multi function LCD display is also provided.

New LCD Display

The new LCD display can indicate frame by frame CTL/time code/user bits, time code modes, and warning indications.



Input Selection

Video and audio sources for the VO-8800 can be selected separately with the CAMERA/LINE switches. Therefore, the VO-8800 can be used in simple portable applications, in which a VTR is directly connected to a video camera, and in EFP applications which require video cameras, a switcher, and other equipment.

×10 Picture Search

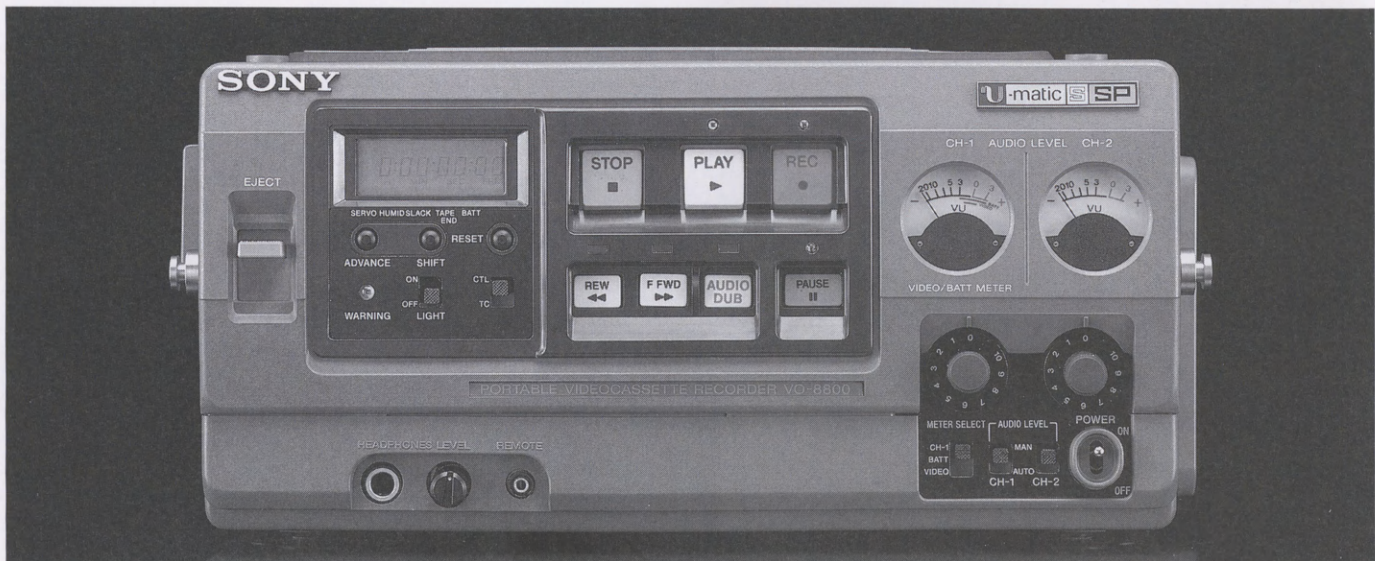
The VO-8800 offers ×10 times normal speed picture search in both the FF and REW modes.

Simple Remote Control

The PLAY, STOP, REC, REW, F FWD, and PAUSE functions can be controlled via the optional RM-770 (wired only)/RM-690 Remote Control unit.



RM-770



Three Way Warning System

The VO-8800 can send warning messages to users via its LCD display, LED indicators on a camera viewfinder, and audible alarms in the monitoring headphone.

Status and Warning Messages

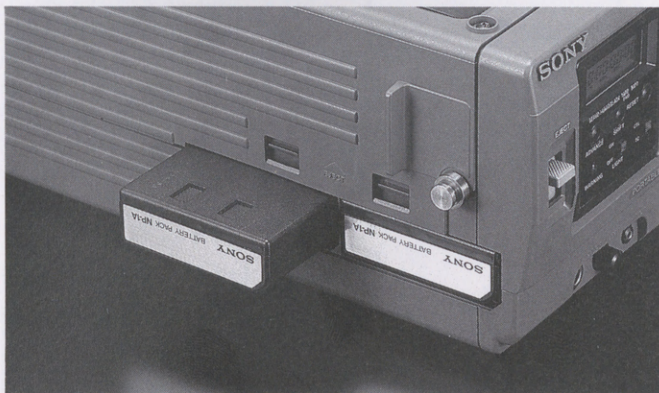
	Camera Viewfinder (DXC-M7)	Warning lamp and LCD display	Beep sound in the Headphone
Drum and capstan servo status	Yes, warning by LED blinking	Yes	Yes
Humidity (head drum condensation)	Yes, warning by LED blinking	Yes	Yes
Tape slack	Yes, warning by LED blinking	Yes	Yes
Tape end (Approx. 1.5 min before end)	Yes, warning by LED blinking	Yes	Yes
Battery status	Yes, warning by LED blinking	Yes	Yes
Tape remain time	Yes, by character	No	No
Record	Yes, by LED	No	No
Pause	Yes, by LED	No	No

Self-diagnostic Function

Service time for the VO-8800 is kept to minimum via the self-diagnostic function.

NP-1A Battery Operation

Two NP-1A batteries can be installed into the VO-8800, and the VO-8800 can continuously operate for a maximum of 60 minutes with the DXC-M7 video camera. The VO-8800 can be connected to the CMA-8 Camera Adaptor for AC voltage operation.



RF Modulator (NTSC only)

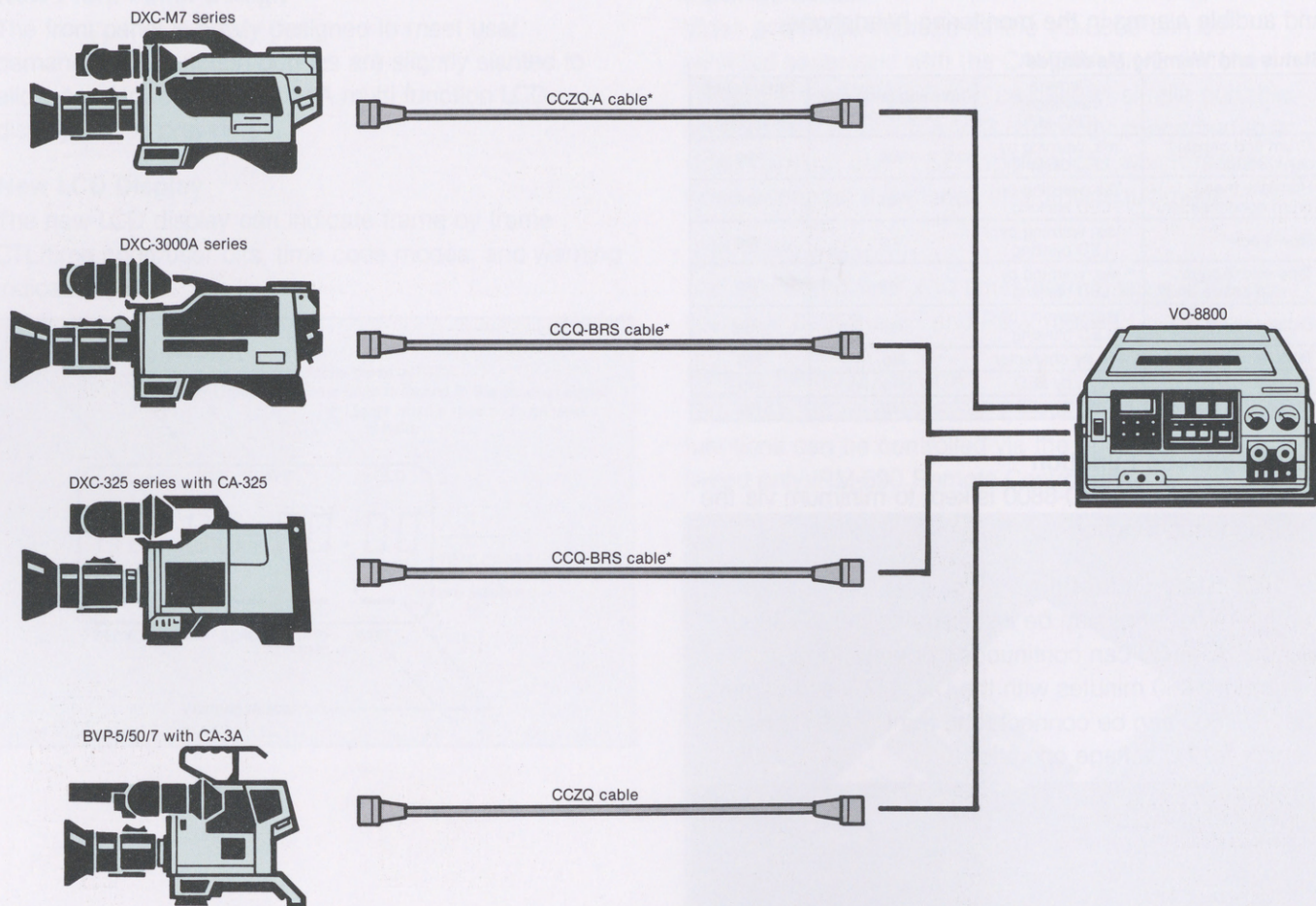
Since a built-in RF modulator is provided in the VO-8800, the VO-8800 can be connected to a American standard TV monitor (ch-3 or 4) for viewing.

Compact and Lightweight

The VO-8800 is compact (263 × 130 × 354mm/ 10³/₈ × 5¹/₈ × 14") and lightweight (Approx. 6.2kg/ 13 lb 10 oz).

IV. VO-8800 OUTSTANDING FEATURES

5. VO-8800 Camera Connection Cable

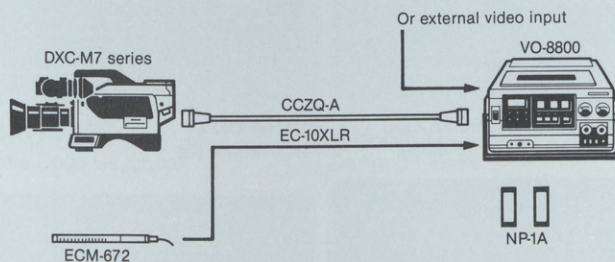


*Note: Selectable of Y/C composite connection can be made with a switch located on the camera using the same cable.

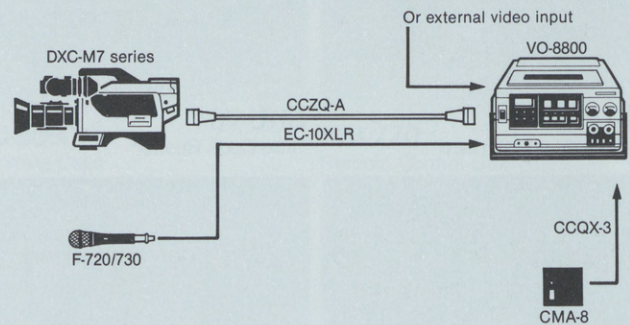
6. VO-8800 System Applications

Example 1. Recording System

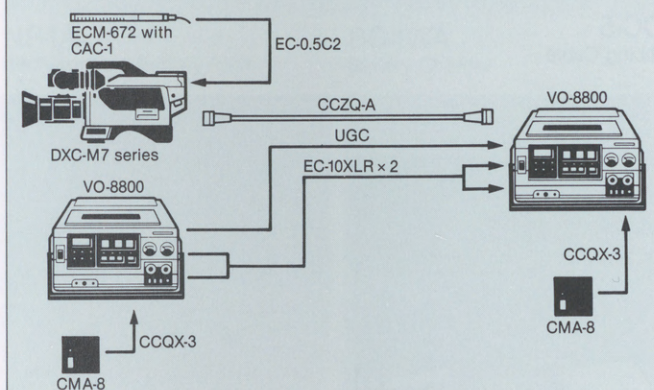
1-1. DC operation



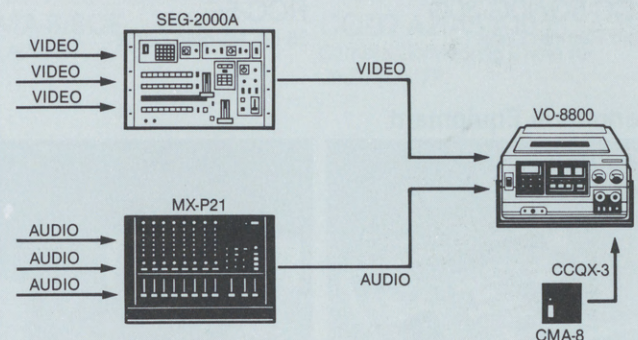
1-2. AC operation



1-3. CAM/LINE selectable system

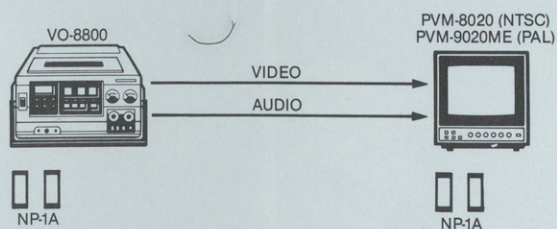


1-4. EFP system

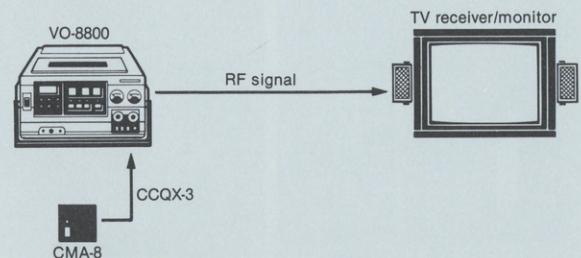


Example 2. Playback System

2-1. Field monitor



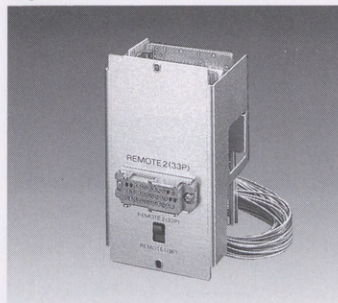
2-2. Television monitor (NTSC only)



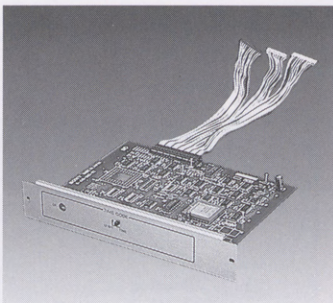
V. OPTIONAL ACCESSORIES AND PERIPHERAL EQUIPMENT

< VO-9850/9800 >

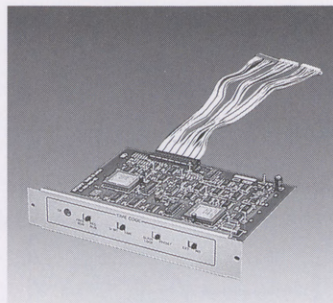
Optional Accessories



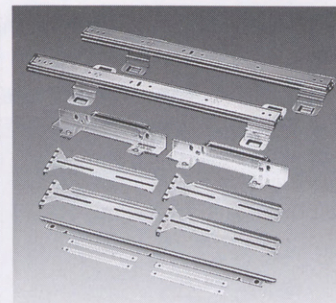
BKU-703
33-pin Editing Interface



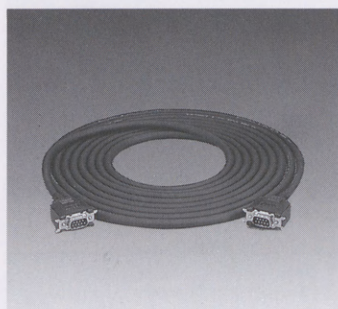
BKU-704
Time Code Reader



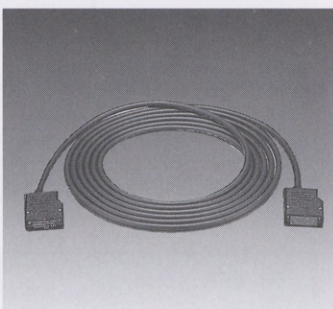
BKU-705 for VO-9850
Time Code Generator/Reader



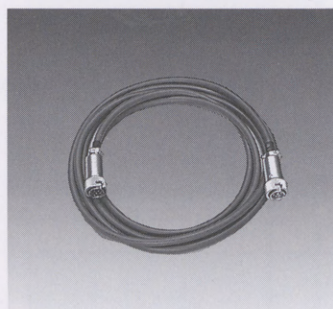
RMM-501
Rack Mount Kit



RCC-5G/10G/30G
9-pin Remote Cable



RCC-5F
33-pin Remote Cable



VDC-5
Dubbing Cable

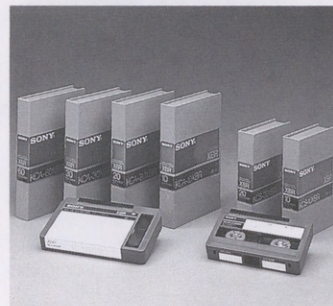
Peripheral Equipment



RM-450/450CE
Editing Remote Control Unit

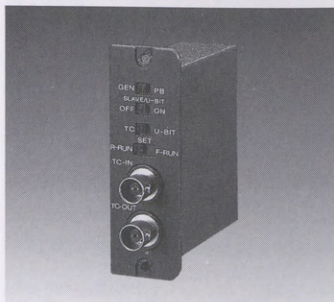


KSP-10/20/30/60
KSP-S10/S20
SP U-matic Videocassette

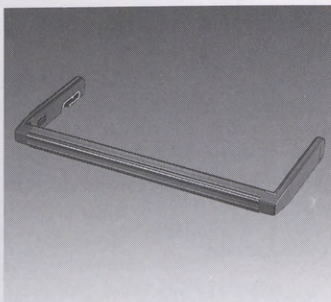


KCA-10/20/30/60BRS
KCS-10/20BRS
KCA-10/20/30/60XBR
KCS-10/20XBR
U-matic Videocassette

Optional Accessories



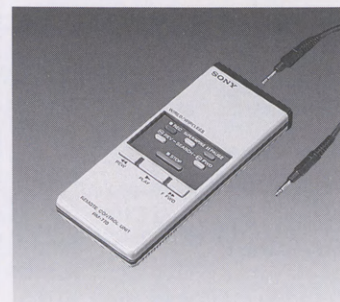
BKU-706
Time Code Generator



AH-8800
Carrying Handle



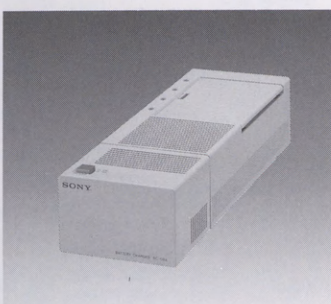
LC-8800
Carrying Case



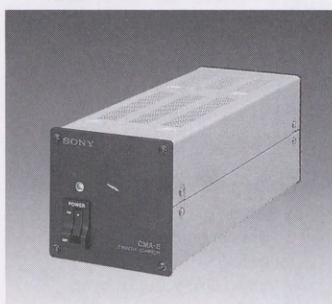
RM-770
Remote Control Unit



NP-1A
Rechargeable Battery Pack



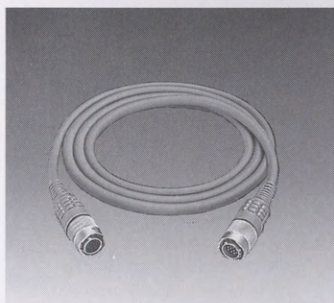
BC-1WA
Battery Charger



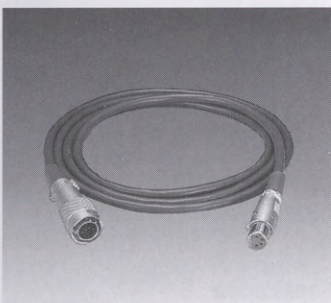
CMA-8/8CE
AC Adaptor



CCZQ-A2/A5/A10
Camera Connecting Cable for
DXC-M7/M7P



**CCQ-2BRS/5BRS/
10BRS**
Camera Connecting Cable
for DXC-3000A/3000AP
DXC-325/325P

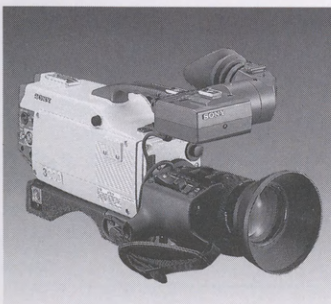


CCQX-3
AC Adaptor Cable

Peripheral Equipment



DXC-M7/M7P
Color Video Camera



DXC-3000A/3000AP
Color Video Camera



DXC-325/325P
Color Video Camera



KSP-S10/S20
KCS-10/20
U-matic Videocassette (small)

VI. SPECIFICATIONS

VO-9850

GENERAL

Weight:	21.4 kg (47 lb 2 oz)
Dimensions:	426(W) × 238(H) × 513(D)mm (16 ⁷ / ₈ × 9 ³ / ₈ × 20 ¹ / ₄ ")
Power requirements:	AC 120V, 50/60Hz
Operating voltage:	AC 90 ~ 132V
Power consumption:	90W (with BKU-703, BKU-705, and RM-440)
Operating temperature:	5°C ~ 40°C (41°F ~ 104°F)
Videocassette:	SONY KSP, KSP-S, KCA-BRS, KCS-BRS, KCA-XBR, KCS-XBR series or equivalent
Recording and playback time:	60 min.
Fast forward time:	Less than 4 min. (with SONY KSP-60 U-matic videocassette)
Rewind time:	Less than 4 min. (with SONY KSP-60 U-matic videocassette)
Search Speed:	SHUTTLE mode: STILL, 1/30, 1/10, 1/5, 1/2, 1, 2, 5, 8 times normal speed in the forward and reverse direction JOG mode: STILL to normal speed in the forward and reverse direction

VIDEO

Video recording system:	Rotary 2-head helical scan system Luminance: FM recording Chrominance: SC low-range conversion recording
Input:	NTSC composite video, 1.0Vp-p ± 0.3V, sync negative, 75 ohms, unbalanced
Output:	NTSC composite video, 1.0Vp-p ± 0.2V, sync negative, 75 ohms, unbalanced
Dubbing input:	7-pin × 1
Dubbing output:	7-pin × 1
Horizontal resolution:	SP mode: 330 lines (color/monochrome) Conventional mode: 250 lines (color/monochrome)
S/N ratio:	SP mode: Better than 46dB (color) Better than 48dB (monochrome) Conventional mode: Better than 46dB (color)
EXT SYNC IN:	2.5V (1.0 ~ 5.0V)p-p, negative, 75 ohms, unbalanced
SC IN:	1.0V (0.5 ~ 3.0V)p-p, 75 ohms, unbalanced
RF OUT (OFF TAPE):	0.5V (0.3 ~ 1.0V)p-p, 75 ohms, unbalanced
TIME CODE	
Input:	0dB ± 6dB, 10k ohms, unbalanced (0dB = 1.55Vp-p pulse)
Output:	0dB ± 3dB, low impedance, unbalanced (0dB = 1.55Vp-p pulse)

AUDIO

Input:	LINE: +4dB, 10k ohms, balanced Microphone: -60dB, 3k ohms, unbalanced
Output:	Line: +4dBm (at 600 ohms), balanced Headphone: -26dB ~ -46dB (at 8 ohms), unbalanced Monitor: -5dB (at 47k ohms), unbalanced
Distortion:	Less than 2%
Frequency response:	50Hz ~ 15kHz
Wow and Flutter:	Less than 0.18% rms
S/N ratio:	SP mode: Better than 52dB (3% distortion without Dolby NR) Conventional mode: Better than 50dB (3% distortion)

SUPPLIED ACCESSORIES

Operation manual (1)
AC cord (1)

VO-9850P

GENERAL

Weight:	21.4 kg (47 lb 2 oz)
Dimensions:	426(W) × 238(H) × 513(D)mm (16 ⁷ / ₈ × 9 ³ / ₈ × 20 ¹ / ₄ ")
Power requirements:	AC 220 ~ 240V, 50 ~ 60Hz
Operating voltage:	AC 90 ~ 264V
Power consumption:	90W (with the BKU-705 installed)
Operating temperature:	5°C ~ 40°C (41°F ~ 104°F)
Videocassette:	SONY KSP, KSP-S, KCA-BRS, KCS-BRS, KCA-XBR, KCS-XBR series or equivalent
Recording and playback time:	60 min.
Fast forward time:	Less than 4 min. (with SONY KSP-60 U-matic videocassette)
Rewind time:	Less than 4 min. (with SONY KSP-60 U-matic videocassette)
Search speed:	SHUTTLE Mode: STILL, 1/30, 1/10, 1/5, 1/2, 1, 2, 5, 8 times normal speed in the forward and reverse direction JOG mode: STILL to normal speed in the forward and reverse directions

VIDEO

Video recording system:	Rotary 2-head helical scan system Luminance: FM recording Chrominance: SC low-range conversion recording
Input:	PAL composite video, 1.0Vp-p ± 0.3V, sync negative, 75 ohms, unbalanced
Output:	PAL composite video, 1.0Vp-p ± 0.2V, sync negative, 75 ohms, unbalanced
Dubbing input:	7-pin × 1
Dubbing output:	7-pin × 1
Horizontal resolution:	SP mode: 300 lines (color/monochrome) High Band mode: 260 lines (color/monochrome) Low Band mode: 250 lines (color/monochrome)
S/N ratio:	SP/High Band/Low Band mode: Better than 46dB (color) Better than 48dB (monochrome)
EXT SYNC IN:	2.5V (2.0 ~ 5.0V)p-p, negative, 75 ohms, unbalanced
RF OUT (OFF TAPE):	0.5V (0.3 ~ 1.0V)p-p, 75 ohms, unbalanced
TIME CODE	
Input:	0dB ± 6dB, 10K ohms, unbalanced (0dB = 1.55Vp-p pulse)
Output:	0dB ± 3dB, low impedance, unbalanced (0dB = 1.55Vp-p pulse)

AUDIO

Input:	LINE: +4dB 10K ohms, balanced Microphone: -60dB, 3K ohms, unbalanced
Output:	LINE: +4dBm (at 600 ohms), balanced Headphone: -26dB ~ -46dB (at 8 ohms), unbalanced Monitor: -5dB (at 47k ohms), unbalanced
Distortion:	Less than 2%
Frequency response:	50Hz ~ 15kHz
Wow and flutter:	Less than 0.23% DIN
S/N ratio:	SP mode: Better than 52dB (3% distortion without Dolby NR) Conventional mode: Better than 50dB (3% distortion)

SUPPLIED ACCESSORIES

Operational manual (1)
AC cord (1)

VO-9800

GENERAL

Weight:	21.4 kg (47 lb 2 oz)
Dimensions:	426(W) × 238(H) × 513(D)mm (16 ⁷ / ₈ × 9 ³ / ₈ × 20 ¹ / ₄ ")
Power requirements:	AC 120V, 50/60Hz
Operating voltage:	AC 90 ~ 132V
Power consumption:	85W (with BKU-703, BKU-704 and RM-440)
Operating temperature:	5°C ~ 40°C (41°F ~ 104°F)
Videocassette:	SONY KSP, KSP-S, KCA-BRS, KCS-BRS, KCA-XBR, KCS-XBR series or equivalent
Fast forward time:	Less than 4 min. (with SONY KSP-60 U-matic videocassette)
Rewind time:	Less than 4 min. (with SONY KSP-60 U-matic videocassette)
Search speed:	SHUTTLE Mode: STILL, ¹ / ₃₀ , ¹ / ₁₀ , ¹ / ₅ , ¹ / ₂ , 1, 2, 5 8 times normal speed in the forward and reverse direction JOG Mode: STILL to normal speed in the forward and reverse direction

VIDEO

Video recording system:	Rotary 2-head helical scan system Luminance: FM recording Chrominance: SC low-range conversion recording
Input:	NTSC composite video, 1.0Vp-p ± 0.3V, sync negative, 75 ohms, unbalanced
Output:	NTSC composite video, 1.0Vp-p ± 0.2V sync negative, 75 ohms, unbalanced
Dubbing input:	7-pin × 1
Dubbing output:	7-pin × 1
Horizontal resolution:	SP mode: 330 lines (color/monochrome) Conventional mode: 250 lines (color/monochrome)
S/N ratio:	SP mode: Better than 46dB (color) Better than 48dB (monochrome) Conventional mode: Better than 46dB (color)
EXT SYNC IN:	2.5V (1.0 ~ 5.0V)p-p, negative, 75 ohms, unbalanced
SC IN:	1.0V (0.5 ~ 3.0V)p-p, 75 ohms, unbalanced
RF OUT (OFF TAPE):	0.5V (0.3 ~ 1.0V)p-p, 75 ohms, unbalanced

TIME CODE

Input:	0dB ± 6dB, 10k ohms, unbalanced (0dB = 1.55Vp-p pulse)
Output:	0dB ± 3dB, low impedance, unbalanced (0dB = 1.55Vp-p pulse)

AUDIO

Input:	Line: +4dB, 10K ohms, balanced Microphone: -60dB, 3k ohms, unbalanced
Output:	Line: +4dBm (at 600 ohms), balanced Headphone: -26dB ~ -46dB (at 8 ohms), unbalanced Monitor: -5dB (at 47k ohms), unbalanced Less than 2%
Distortion:	Less than 2%
Frequency response:	50Hz ~ 15kHz
Wow and flutter:	Less than 0.18% rms
S/N ratio:	SP mode: Better than 52dB (3% distortion without Dolby NR) Conventional mode: Better than 50dB (3% distortion)

SUPPLIED ACCESSORIES

Operation manual (1)
AC cord (1)

VO-9800P

GENERAL

Weight:	21.1 kg (47 lb 2 oz)
Dimensions:	426(W) × 238(H) × 513(D)mm (16 ⁷ / ₈ × 9 ³ / ₈ × 20 ¹ / ₄ ")
Power requirements:	AC 220 ~ 240V, 50/60Hz
Operating voltage:	AC 90 ~ 264V
Power consumption:	85W (with BKU-703 and BKU-704, and RM-440)
Operating temperature:	5°C ~ 40°C (41°F ~ 104°F)
Videocassette:	SONY KSP, KSP-S, KCA-BRS, KCS-BRS, KCA-XBR, KCS-XBR series or equivalent
Recording and playback time:	60 min.
Fast forward time:	Less than 4 min. (with SONY KSP-60 U-matic videocassette)
Rewind time:	Less than 4 min. (with SONY KSP-60 U-matic videocassette)
Search speed:	SHUTTLE Mode: STILL, ¹ / ₃₀ , ¹ / ₁₀ , ¹ / ₅ , ¹ / ₂ , 1, 2, 5, 8 times normal speed in the forward and reverse direction JOG mode: STILL to normal speed in the forward and reverse direction

VIDEO

Video recording system:	Rotary 2-head helical scan system Luminance: FM recording Chrominance: SC low-range conversion recording
Input:	PAL composite video, 1.0Vp-p ± 0.3V, sync negative, 75 ohms, unbalanced
Output:	PAL composite video, 1.0Vp-p ± 0.2V sync negative, 75 ohms, unbalanced
Dubbing input:	7-pin × 1
Dubbing output:	7-pin × 1
Horizontal resolution:	SP mode: 300 lines (color/monochrome) High Band mode: 260 lines (color/monochrome) Low Band mode: 250 lines (color/monochrome)
S/N ratio:	SP/High Band/Low Band mode: Better than 46dB (color) Better than 48dB (monochrome)
EXT SYNC IN:	2.5V (2.0 ~ 5.0V)p-p, negative, 75 ohms, unbalanced
RF OUT (OFF TAPE):	0.5V (0.3 ~ 1.0V)p-p, 75 ohms, unbalanced

TIME CODE

Input:	0dB ± 6dB, 10k ohms, unbalanced (0dB = 1.55Vp-p pulse)
Output:	0dB ± 3dB, low impedance, unbalanced (0dB = 1.55Vp-p pulse)

AUDIO

Input:	Line: +4dB, 10k ohms, balanced Microphone: -60dB, 3k ohms, unbalanced
Output:	Line: +4dBm (at 600 ohms), balanced Headphone: -26dB ~ -46dB (at 8 ohms), unbalanced Monitor: -5dB (at 47k ohms), unbalanced Less than 2%
Distortion:	Less than 2%
Frequency response:	50Hz ~ 15kHz
Wow and flutter:	Less than 0.23% DIN
S/N ratio:	SP mode: Better than 52dB (3% distortion without Dolby NR) Conventional mode: Better than 50dB (3% distortion)

SUPPLIED ACCESSORIES

Operation manual (1)
AC cord (1)

VI. SPECIFICATIONS

VO-8800

GENERAL

Weight: Approx. 6.2 kg (13 lb 10 oz)
 Dimensions: 263(W) × 130(H) × 354(D)mm (10³/₈ × 5¹/₈ × 14")
 Power requirements: DC 12V
 AC operation with CMA-8 Camera Adaptor (optional)
 Power consumption: 18W
 Operating temperature: 0°C ~ 40°C (32°F ~ 104°F)
 Videocassette: SONY KSP-S, KCS-BRS, KCS-XBR series or equivalent
 Tape speed: 9.53cm/sec.
 Recording and playback time: 20 min.
 Fast forward time: Less than 3 min. (with SONY KSP-S20 U-matic videocassette)
 Rewind time: Less than 3 min. (with SONY KSP-S20 U-matic videocassette)
 Search speed: 10 times normal speed in the forward and reverse direction

VIDEO

Video head: Rotary 4-head
 (R/P: 2, Simultaneous playback: 2)
 Video recording system: Luminance: FM recording
 Chrominance: SC low-range conversion recording
 Input: NTSC composite video, 1.0Vp-p ± 0.3V, sync negative, 75 ohms, unbalanced
 Output: NTSC composite video, 1.0Vp-p ± 0.2V, sync negative, 75 ohms, unbalanced
 Horizontal resolution: SP mode: 330 lines (color/monochrome)
 Conventional mode: 250 lines (color/monochrome)
 S/N ratio: Better than 46dB (color)

AUDIO

Input: AUDIO IN CH-1/L/DUB, CH-2/R
 (XLR 3-pin female) × 1 each
 +4dB/ -20dB/ -60dB switchable
 +4dB: more than 10k ohms, balanced
 -20dB/ -60dB: more than 3k ohms, balanced
 CAMERA (microphone input) (audio channel 2)
 +4dB/ -20dB/ -60dB switchable
 +4dB: more than 10k ohms, balanced
 -20dB/ -60dB: more than 3k ohms, balanced
 Output: Line: +4dB, low impedance, balanced
 Headphone: -40dB ~ -20dB (at 8 ohms), unbalanced
 Distortion: Less than 2%
 Frequency response: 50Hz ~ 15kHz
 Wow and flutter: Less than 0.18% rms
 S/N ratio: SP mode: Better than 52dB
 (3% distortion without Dolby NR)
 Conventional mode: Better than 50dB
 (3% distortion)

SUPPLIED ACCESSORIES

Operation manual (1)
 Shoulder strap (1)

VO-8800P

GENERAL

Weight: Approx. 6.2kg (13 lb 10 oz)
 Dimensions: 263(W) × 130(H) × 354(D)mm (10³/₈ × 5¹/₈ × 14")
 Power requirements: DC 12V
 AC operation with CMA-8CE Camera Adaptor (optional)
 Power consumption: 17.5W
 Operating temperature: 0°C ~ 40°C (32°F ~ 104°F)
 Videocassette: SONY KSP-S, KCS-BRS, KCS-XBR series or equivalent
 Tape speed: 9.53cm/sec.
 Recording and playback time: 20 min.
 Fast forward time: Less than 3 min. (with SONY KSP-S20 U-matic videocassette)
 Rewind time: Less than 3 min. (with SONY KSP-S20 U-matic videocassette)
 Search speed: 10 times normal speed in the forward and reverse direction

VIDEO

Video head: Rotary 4-head
 (R/P: 2, Simultaneous playback: 2)
 Video recording system: Luminance: FM recording
 Chrominance: SC low-range conversion recording
 Input: PAL composite video, 1.0Vp-p ± 0.3V, sync negative, 75 ohms, unbalanced
 Output: PAL composite video, 1.0Vp-p ± 0.2V, sync negative, 75 ohms, unbalanced
 Horizontal resolution: SP mode: composite video input 300 lines (color/monochrome)
 Y/C input 330 lines
 High Band mode: 260 lines
 S/N ratio: Better than 45dB (color)

AUDIO

Input: AUDIO IN CH-1/L/DUB, CH-2/R
 (XLR 3-pin female) × 1 each
 +4dB/ -20dB/ -60dB switchable
 +4dB: more than 10k ohms, balanced
 -20dB/ -60dB: more than 3k ohms, balanced
 CAMERA (microphone input) (audio channel 2)
 +4dB/ -20dB/ -60dB switchable
 +4dB: more than 10k ohms, balanced
 -20dB/ -60dB: more than 3k ohms, balanced
 Output: Line: +4dB, low impedance, balanced
 Headphone: -40dB ~ -20dB (at 8 ohms), unbalanced
 Distortion: Less than 2%
 Frequency response: 50Hz ~ 15kHz
 Wow and flutter: Less than 0.20% DIN
 S/N ratio: SP mode: Better than 52dB
 (3% distortion without Dolby NR)
 Conventional mode: Better than 50dB
 (3% distortion)

SUPPLIED ACCESSORIES

Operation manual (1)
 Shoulder strap (1)

BKU-703

Connectable to: VO-9800/9800P/9850/9850P
Weight: 230g (8.1 oz)
Dimensions: 63(W) × 109(H) × 64(D)mm (2 1/2 × 4 3/8 × 2 5/8")
Connector: 33-pin
SUPPLIED ACCESSORY Installation manual (1)

BKU-704

Connectable to: VO-9800/9800P
Weight: 190g (6.3 oz)
Dimensions: 199(W) × 41(H) × 145(D)mm (7 7/8 × 1 5/8 × 5 3/4")
Time code: SMPTE/EBU
SUPPLIED ACCESSORY Installation manual (1)

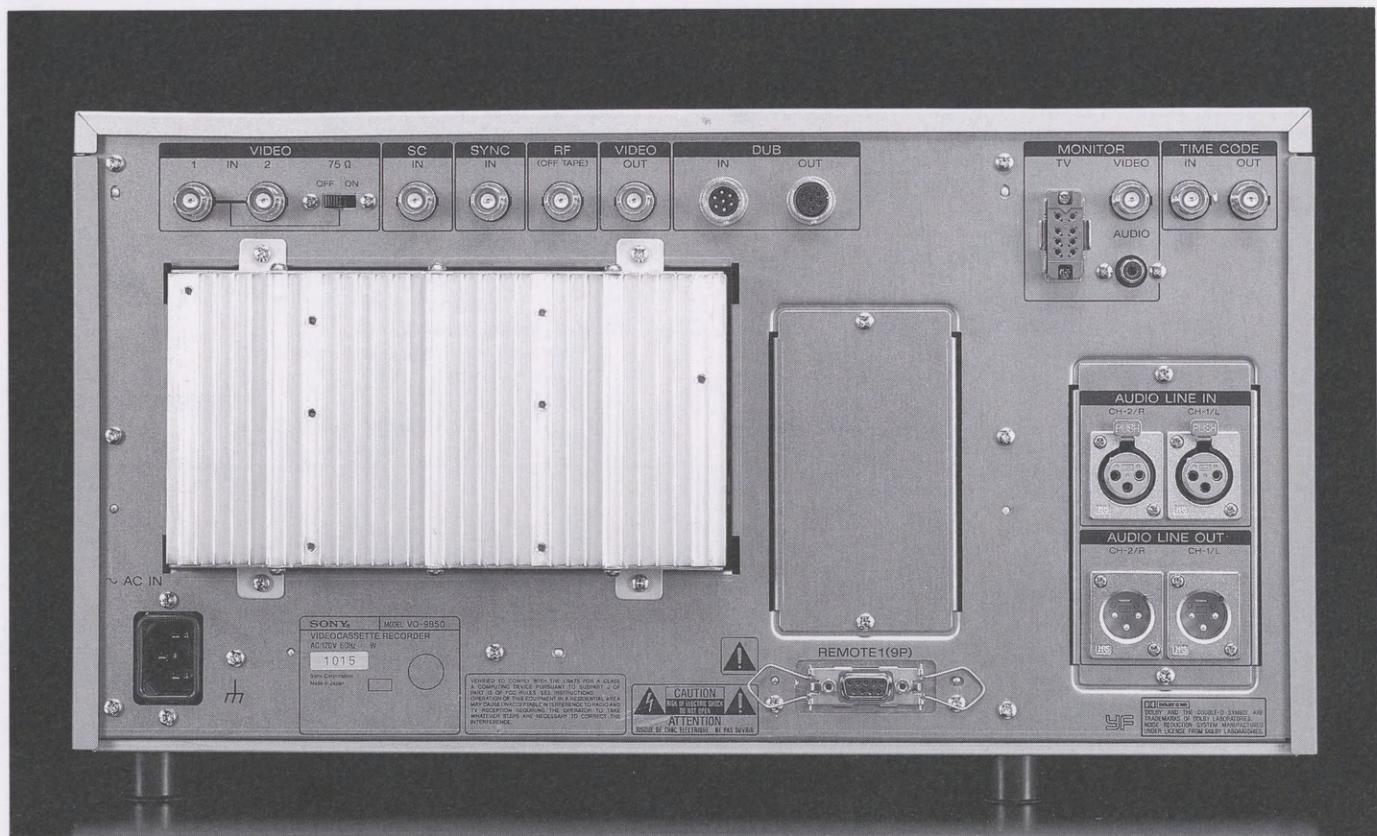
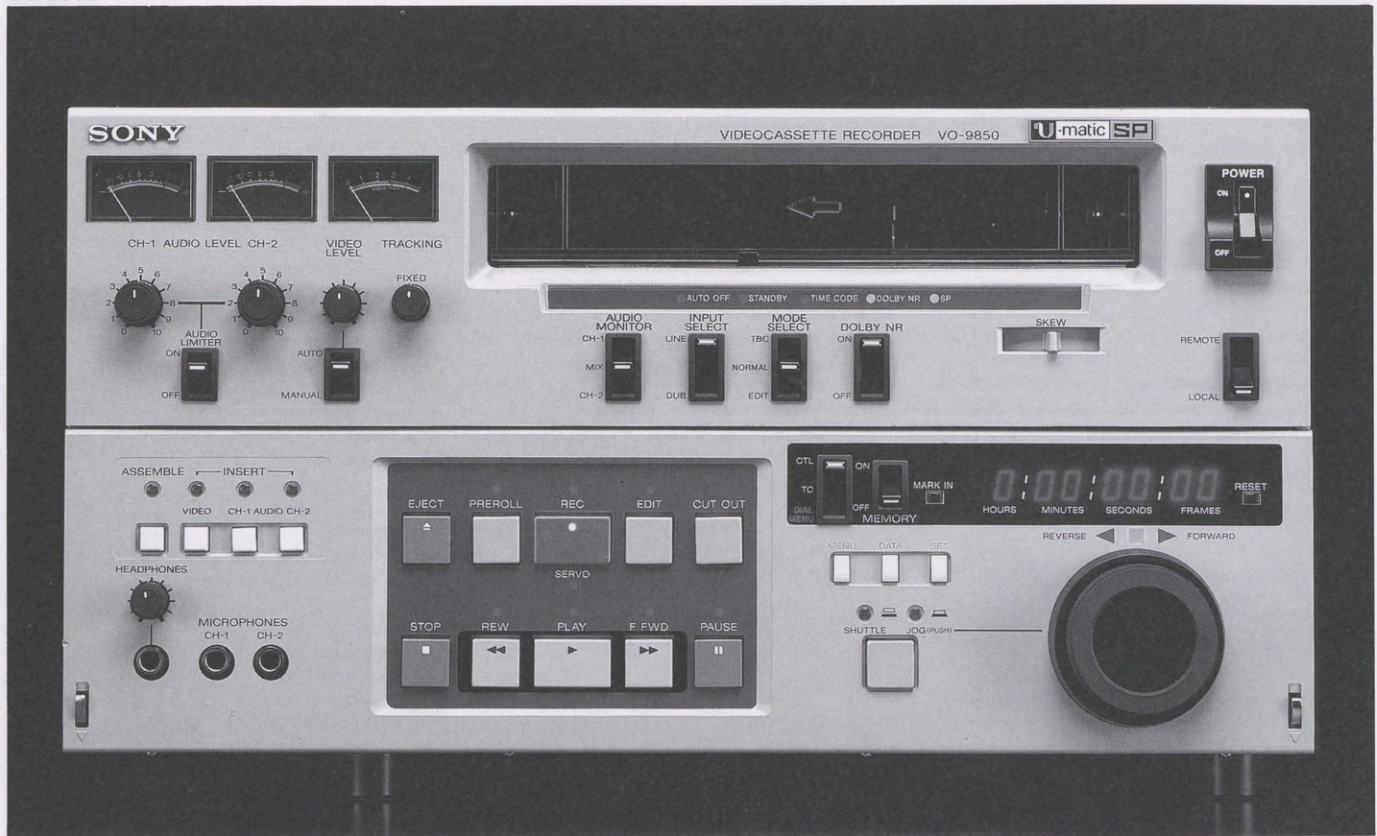
BKU-705

Connectable to: VO-9850/9850P
Weight: 200g (7.1 oz)
Dimensions: 199(W) × 41(H) × 145(D)mm (7 7/8 × 1 5/8 × 5 3/4")
Time code: SMPTE/EBU
Drop/non-drop frame: Selectable (NTSC only)
SUPPLIED ACCESSORY Installation manual (1)

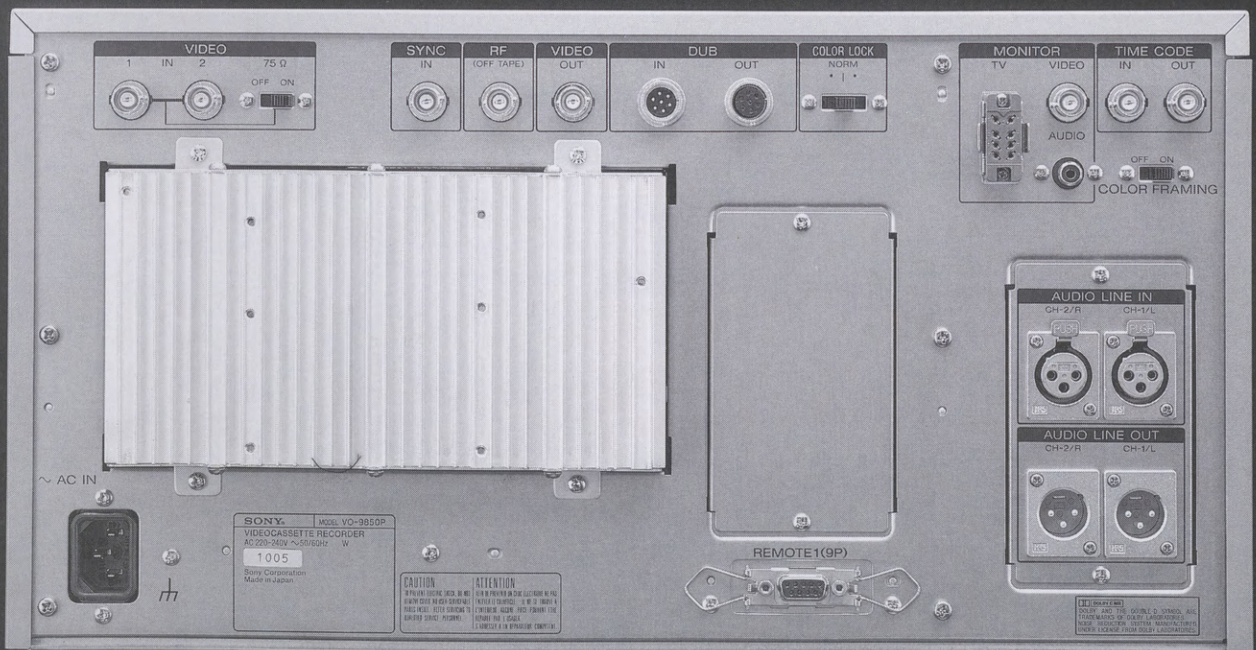
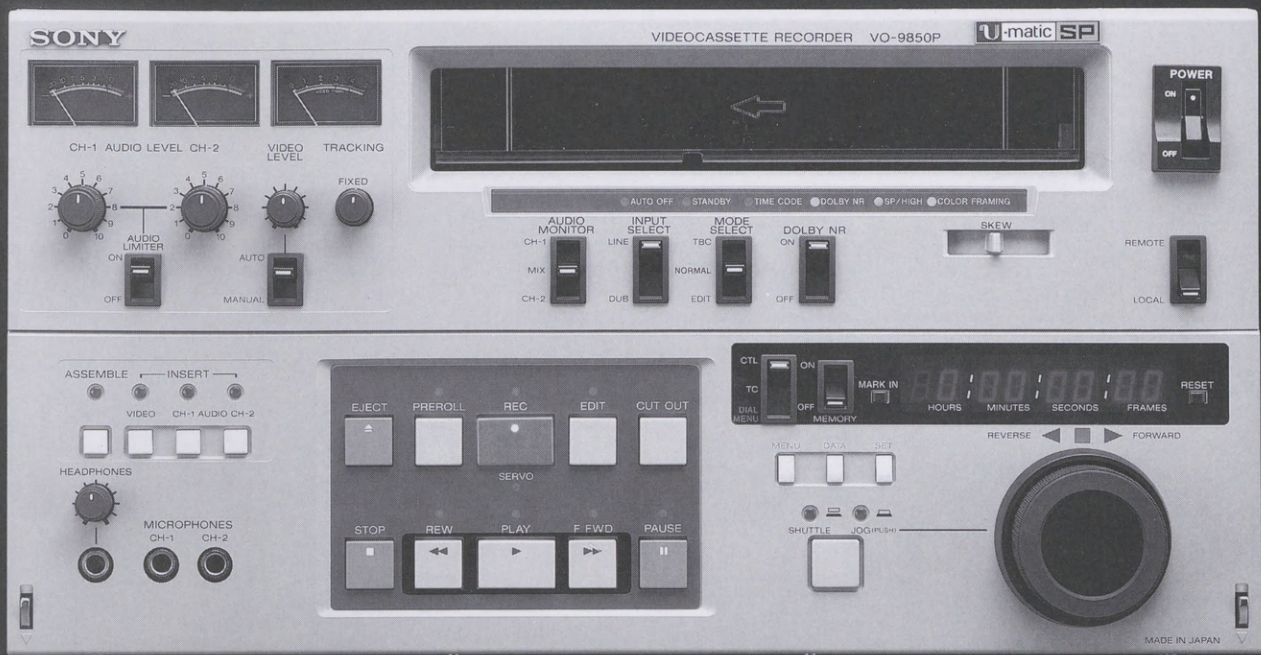
BKU-706

Connectable to: VO-8800/8800P
Weight: 130g (4.6 oz)
Dimensions: 28(W) × 86(H) × 81(D)mm (1 1/8 × 3 1/3 × 3 1/4")
Time code: SMPTE/EBU
Input: 0dB ± 6dB, 10k ohms, unbalanced
(0dB = 1.55Vp-p pulse)
Output: 0dB ± 3dB, low impedance, unbalanced
(0dB = 1.55Vp-p pulse)
Drop/non-drop frame: Selectable (NTSC only)
SUPPLIED ACCESSORY Installation manual (1)

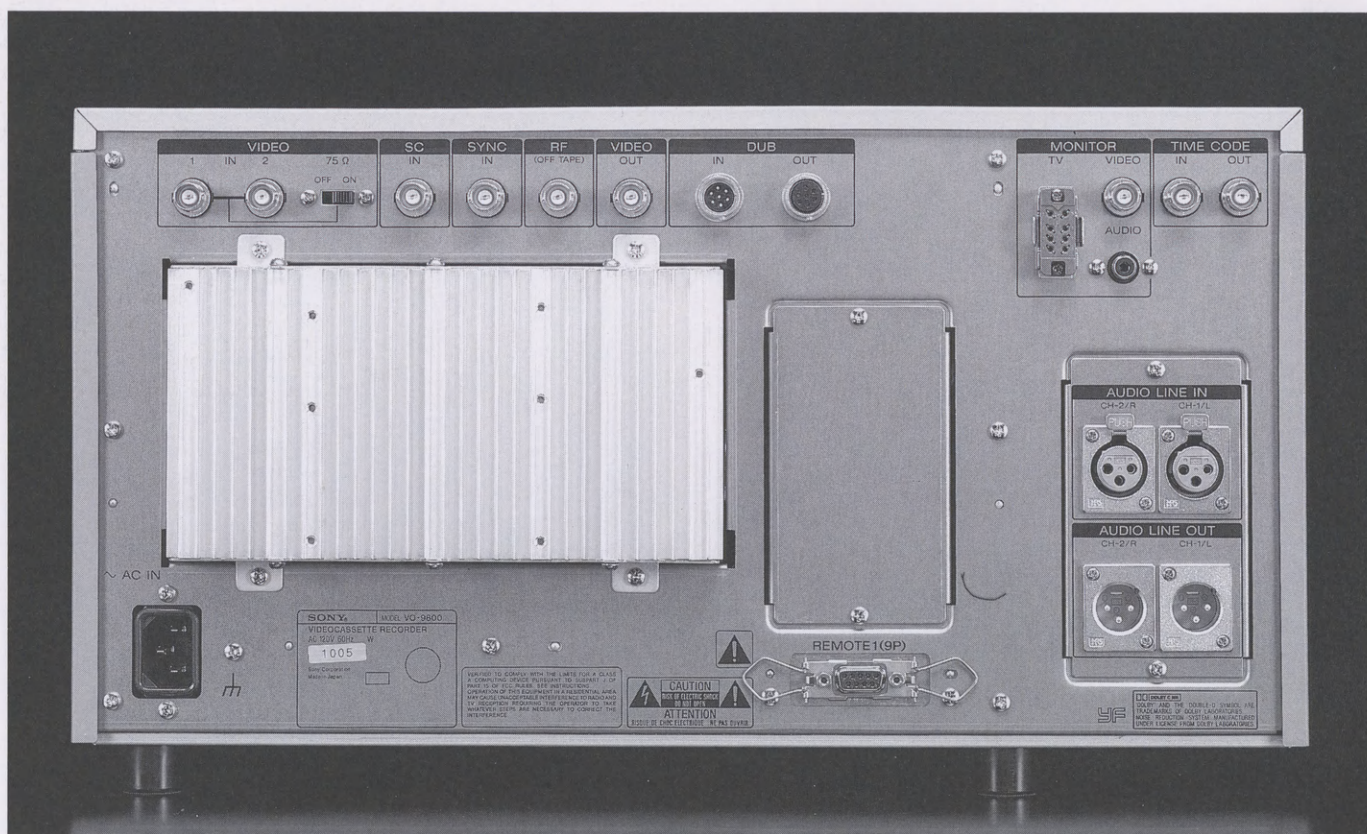
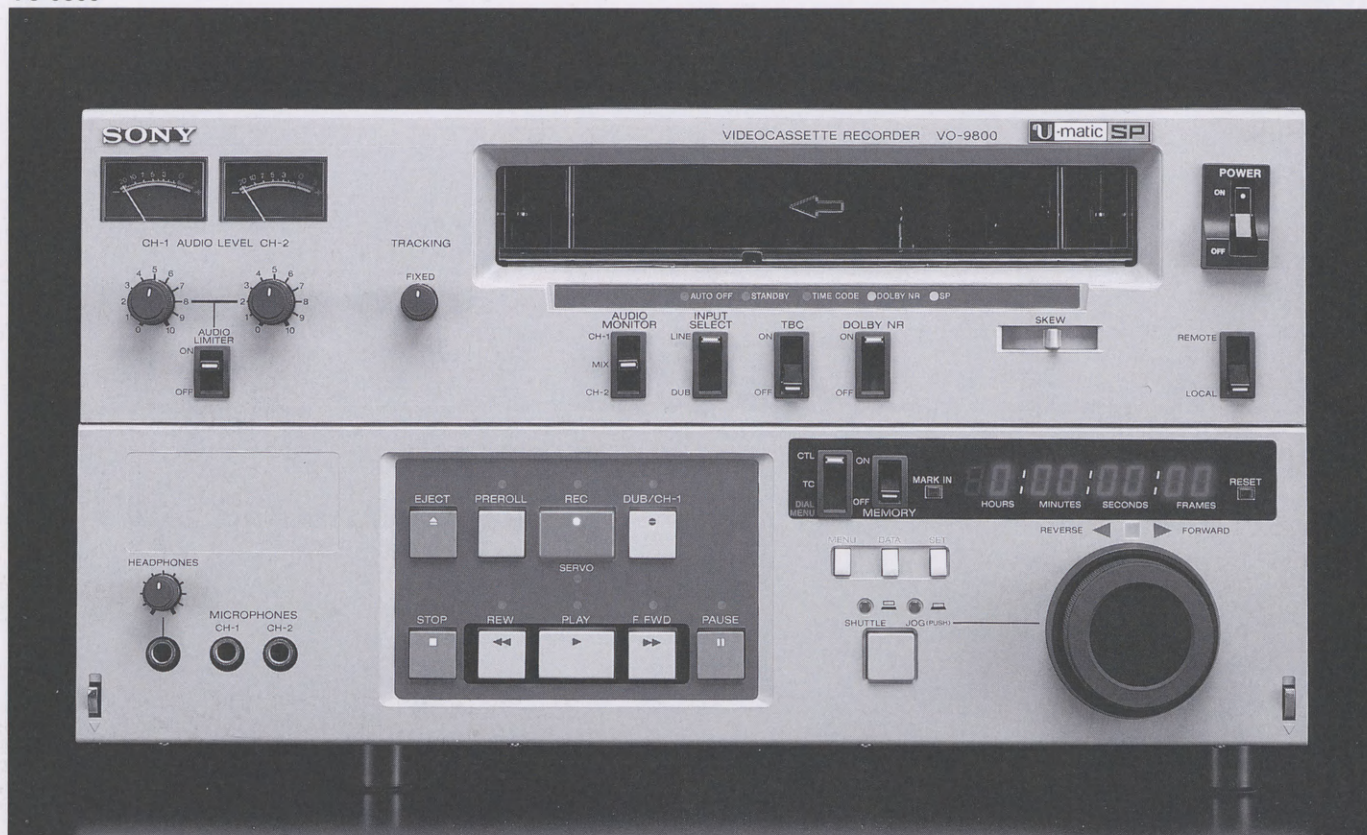
VO-9850



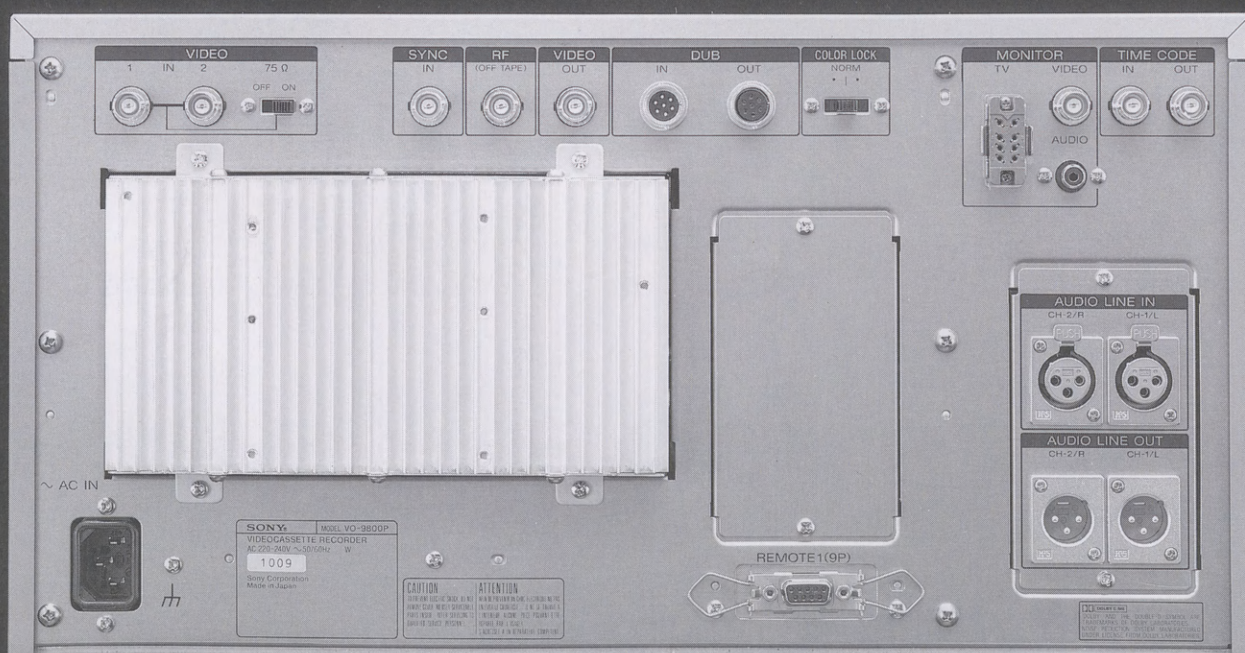
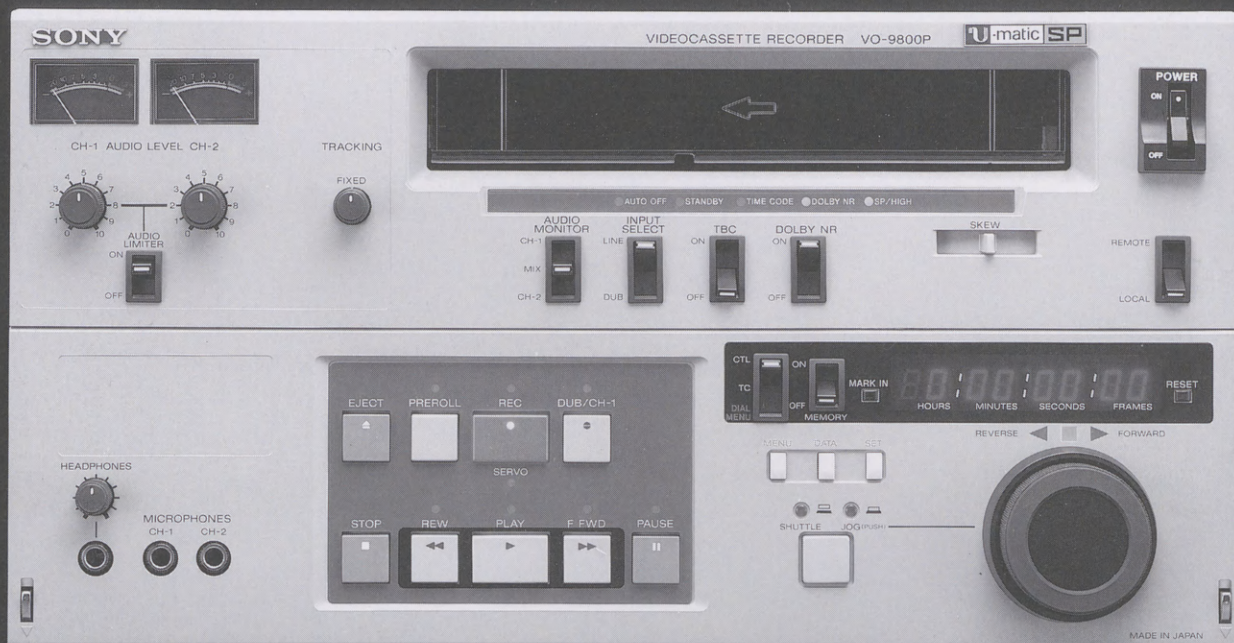
VO-9850P



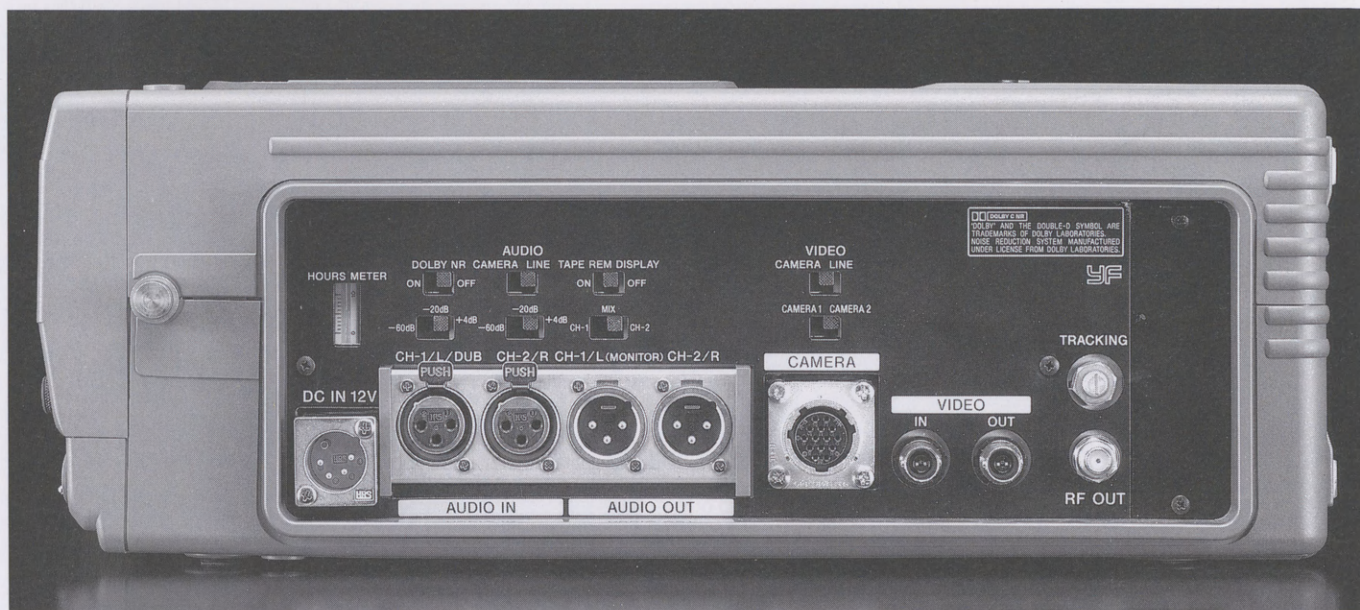
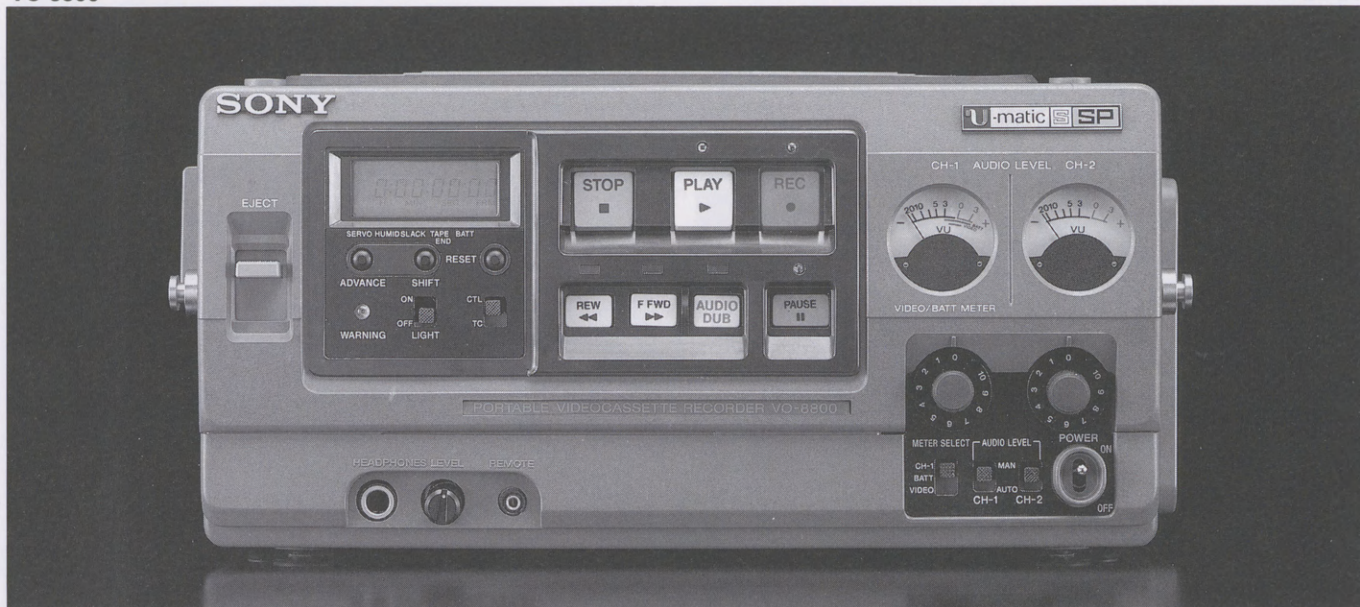
VO-9800



VO-9800P



VO-8800



VO-8800P

